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ABSTRACT

This document contains the following papers from the 2002 Special Libraries Association Conference: (1) "Competencies for the 21st Century Information Professional: Translating the SLA Competencies into Business Competencies" (Sue Henczel); (2) "Compromises along the Way: Balancing Speed to Market with Sustainability While Delivering Knowledge Management Services" (Martha K Heyman); (3) "E-Training: Meeting the Users on Their Terms" (Joan Daghita, Kathryn Dudley, Janet Heekin, Nancy Terry); (4) "Globalization in a Biopharmaceutical Company: Serono's E-Library Project" (Maria Concetta Audino, Maria Baez, Denise Carter, William MacDonald); (5) "In a Do-it-Yourself World, Who Needs Librarians?" (Scott J. Wilson); (6) "Keeping Knowledge Management Alive" (Beth C. Perell, William M. Mercer); (7) "Putting Knowledge to Work Effectively: Assessing Information Needs through Focus Groups" (Valerie E. Perry); (8) "Raising the Bar or Training Library Technicians To Assume Reference Responsibilities" (Barbara Brandys, Joan Daghita, Susan Whitmore); (9) "Analysis and Visualization: Hit or Hype?" (Bill Bartelt); (10) "Characteristics of Information Agencies (Libraries) and Information Agents (Librarians) in Highly Productive Computer Software and Services Companies: The Key to Growth and Survival?" (Margaret Aby Carroll, Yvonne J. Chandler); (11) "Collaborative Marketing: Library and Vendor Partnerships" (Jacqueline H. Trolley, Ryan Sheppard); (12) "Developing E-Business Information Without a Business School" (Hema Ramachandran, Louisa Toot, Carolina Smith); (13) "Do Librarians Really Do That? Or Providing Custom, Fee-Based Services" (Susan Whitmore, Janet Heekin); (14) "Homing in on Our Customers: How the Praxair Information Resource Center Reevaluated and Implemented a New Marketing Strategy" (Crystal S. Megaridis); (15) "Leveraging Knowledge: Impact on Low Cost Planetary Mission Design" (Jennifer Momjian); (16) "Marketing Library and Information Services: Comparing Experiences at Large Institutions" (Robert Noel, Timothy Waugh); (17) "Meeting the Needs of Travel Clientele: Tried and True Strategies That Work" (Kathy Blessing, Cherine Whitney); (18) "The NASA Scientific and Technical Information (STI) Program's Implementation of Open Archives Initiative (OAI) for Data Interoperability and Data Exchange" (JoAnne Rocker, George J. Roncaglia, Lynn N. Heimerl, Michael L. Nelson); and (19) "The (Triple) Bottom Line on Corporate Social Reports: CI on the Social

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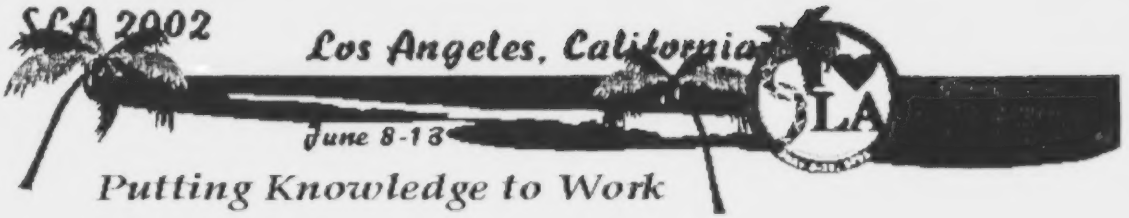

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MONDAY

Competencies for the 21st Century Information Professional:
Translating the SLA Competencies into Business Competencies
by Sue Henczel, CAVAL Collaborative Solutions

Compromises along the Way:
Balancing Speed to Market with Sustainability while Delivering Knowledge Management Services
by Martha K Heyman, MLIS, Deloitte Consulting
Powerpoint presentation of this paper

E-Training:
Meeting the Users on Their Terms
by Joan Daghita, librarian; Kathryn Dudley, librarian; Janet Heekin, librarian; Nancy Terry, librarian, NIH Library, National Institutes of Health, Bethesda, Maryland

Globalization in a Biopharmaceutical Company: Serono's E-Library Project
by Maria Concetta Audino, Serono-Italy; Maria Baez, Serono-Spain; Denise Carter, Serono Corporate-Geneva; William MacDonald, Serono-U.S.
Conference presentation slides from this paper

In a Do-it-Yourself World, Who Needs Librarians?
by Scott J. Wilson, Los Angeles Times Editorial Library

Keeping Knowledge Management Alive
by Beth C. Perell and William M. Mercer

Putting Knowledge to Work Effectively:
Assessing Information Needs through Focus Groups
by Valerie E. Perry, MSLS, public services librarian, Agricultural Information Center, University of Kentucky
Presentation Slides for "Putting Knowledge to Work Effectively"

Raising the Bar or Training Library Technicians to Assume Reference Responsibilities
by Barbara Brandys, technical information specialist; Joan Daghita, librarian; and

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Susan Whitmore, chief, Information & Education Services Section, National Institutes of Health Library, Bethesda, Maryland
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TUESDAY

Analysis and Visualization: **Hit or Hype?**
by Bill Bartelt, senior product manager, CAS, Columbus, Ohio
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Characteristics of Information Agencies (libraries) and Information Agents (librarians) in Highly Productive Computer Software and Services Companies: **The Key to Growth and Survival?**
by Margaret Aby Carroll, doctoral student, University of North Texas, research analyst, Microsoft Corporation; Dr. Yvonne J. Chandler, Ph.D., associate professor, University of North Texas

Collaborative Marketing: **Library and Vendor Partnerships**
by Jacqueline H. Trolley, director, Association Relations, ISI;
Ryan Sheppard, manager and director, Global Marketing, ISI

Developing E-Business Information Without a Business School
by Hema Ramachandran, MLIS; Louisa Toot, MLIS; Carolina Smith, MILS, California Institute of Technology, Pasadena, California

Do Librarians Really Do That? Or Providing Custom, Fee-Based Services
by Susan Whitmore, chief, Information & Education Services Section, and Janet Heekin, librarian, National Institutes of Health Library, Bethesda, Maryland
Powerpoint presentation of this paper

Homing in on our Customers: **How the Praxair Information Resource Center Re-evaluated and Implemented a New Marketing Strategy**
by Crystal S. Megaridis, MALIS, manager, Information Resource Center, Praxair, Inc., Burr Ridge, Illinois

Leveraging Knowledge: **Impact on Low Cost Planetary Mission Design**
by Jennifer Momjian, senior technical librarian, Jet Propulsion Laboratory

Marketing Library and Information Services: **Comparing Experiences at Large Institutions**
by Robert Noel, physics, astronomy, mathematics and computer science librarian, Indiana University, Bloomington, Indiana; Timothy Waugh, Ph.D.; information scientist, Abbott Laboratories, Abbott Park, Illinois

Meeting the Needs of Travel Clientele: **Tried and True Strategies That Work**
by Kathy Blessing, MLIS, Community College of Rhode Island; Cherine Whitney, MLIS, Providence College

The NASA Scientific and Technical Information (STI) Program's Implementation of Open Archives Initiative (OAI) for Data Interoperability and Data Exchange
by JoAnne Rocker; George J. Roncaglia; Lynn N. Heimerl; Michael L. Nelson,

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NASA Langley Research Center, Hampton, Virginia

The (Triple)Bottom Line on Corporate Social Reports: CI on the Social Frontier
by Michael Stevenson, MSLIS, the Center for Corporate Citizenship, Wallace E. Carroll School of Management, Boston College

SLA 2002 Conference Home page

Competencies for the 21st Century Information Professional

Translating the SLA Competencies into Business Competencies

Sue Henczel
CAVAL Collaborative Solutions

INTRODUCTION

What makes an information professional competent in the current global move towards establishing knowledge-based economies? SLA has defined a set of professional and personal competencies that encompass the diverse range of tasks expected of information professionals today. Those of us working in the field know all too well that many of those competencies extend way beyond what we learned in library school - we have become marketers, sellers, packagers, negotiators and politicians in our drive to provide the information and knowledge services needed by our clients and our organizations.

This paper examines how the SLA competencies can be mapped to the broader business competencies of marketing (promoting), packaging (product development), persuading and performing (sales/customer service) and positioning (strategic manoeuvring). It introduces a process whereby the skills, knowledge, understandings and attitudes associated with each competency are identified and matched with the skills required in a business environment.

Having matched the skills, knowledge, understandings and attitudes and mapped the competencies, the author introduces a model for self-evaluation that enables individuals to assess their strengths and weaknesses and identify any skills gap that exists. The assessment can then be used to develop study programs, to support requests for professional development and to supplement performance reviews. If shared, the assessments can also be used to establish teams with an appropriate balance of skills and experience.

THE SLA COMPETENCIES

'Competencies are a combination of skills, knowledge, and behaviours important for organizational success, personal performance and career development. Professional competencies relate to the special librarian's knowledge in the areas of information resources, information access, technology, management, and research, as well as the ability to use these areas of knowledge as a basis for providing library and information services. Personal competencies represent a set of skills, attitudes and values that enable librarians to work efficiently; be good communicators; focus on continuing learning throughout their careers; demonstrate the value-added nature of their contributions; and survive in the new world of work'. [Special Libraries Association, 1997 p.ix]

The 1990s have seen a global move towards competency-based education and assessment for library students in library schools. Competency-based assessment has extended into the

workplace for many information professionals as it enables an organization to evaluate the capabilities and performance of its employees in a measurable and consistent manner that facilitates performance review, staff management and succession planning methodologies. This has resulted in an unprecedented demand for professional development programs both in the workplace and through professional associations. These programs enable individuals to increase their competency levels in areas where gaps have been identified, or where higher levels of competency need to be achieved for promotion, job enhancement or career development.

Since the publication of the SLA competencies in 1997 many other sets of competencies have been developed with the objective of providing the elements of measurability, comparability and consistency to the performance of workers in the library sector. A search on the WWW will find competencies for librarians serving children in public libraries, reference librarians, teacher-librarians, research librarians, law librarians, information searching and retrieval and library instruction to name just a few.

Despite this increasing emphasis on competency, very little work has been done on further evaluation of the skills, knowledge, attitudes and understanding that comprise each competency and how those components relate to an organization in a business sense. It seems very important in this time of focus on the 'bottom-line' and ROI (return on investment) by organizations that information professionals take the time to examine their competencies and to translate them into the language of the business sector. It is also important to understand how the competencies that an individual has can be used to position, package, promote, persuade and perform to demonstrate how they contribute to the objectives of their organization.

BUSINESS COMPETENCIES

To become an integral part of an organization the information professional must provide a significant contribution to the business from the perspective of the organization (management and the broader client base). For this contribution to be recognized and acknowledged you must:

- Speak a language that they understand
- Know the business of the organization (ie. the wider industry)
- Know how the organization works
- Know where your services are needed and can add value
- Know which products and services are needed and how they should be delivered
- Know how to market and sell your products and services
- Know how to consistently deliver and exceed expectations

The professional and personal librarianship competencies can be aligned with the business environment by focusing on the five key issues of (1) Strategic Positioning, (2) Packaging, (3) Promoting, (4) Persuading, and (5) Performing.

Strategic Positioning

This requires a clear understanding of why you are doing your job, what your responsibility is to your organization, who comprises your client base and how you can help them do their jobs better -- from their perspective rather than yours. You must know:

1. Why your organization exists, how it works and what your roles and responsibilities are within the organizational context.
2. Who your clients are and what business solutions you provide for them -- how you can help them do their jobs better / faster / cheaper / more effectively.
3. Who/what your competitors are and what makes you and your services better -- what your 'uniqueness' is.

Packaging

How you package your information product and yourself as the deliverer of the product must be based on the needs of the client and his/her perception of his/her information needs. Create an identity for your products, services and self. Describe the problem/s that you have the solution/s for and then describe your solution/s. Develop a statement of why you are best qualified to provide the solution/s and communicate it in a variety of ways (face-to-face, print, electronic etc.).

Promoting

How you promote your products and services to remain in the forefront of the minds of existing clients and to attract new clients can depend on your ability to target, perform, communicate and network. There are six core promotional strategies-

1. *Referral* - build on the network of those you already know. Referrals come from satisfied clients and those who know you through your reputation and the message you communicate through your marketing.
2. *Network* - gain visibility and credibility. Networking is a powerful way to be seen, get known and build trust amongst those who might use your service or refer you to others who need what you have to offer.
3. *Writing* - gain credibility by communicating your expertise to your organization and industry sector. Writing articles is a powerful way to build credibility and visibility. Your aim is to educate your prospective clients about your ability to apply what you know to their situation.
4. *Speaking* - stand out as an expert on industry-specific information issues. Speaking engagements are a powerful way to gain immediate credibility and can attract clients immediately.
5. *Direct approach* - approach prospective clients directly.
6. *Keep-in-touch* - stay in touch with clients so they don't forget you when they need your services. (Middleton, 2000)

Persuading

Persuasion is the one-to-one part of the marketing process that is happening anytime you are communicating about your services. It is the process of discovering if there is a match between the prospective client needs and what you have to offer. It is a conversation to determine how you can help your prospects attain their goals.

Performing

Performance is in the eye of the beholder - understand your clients' expectations and then exceed them. To do this effectively client needs and expectations must be explicit rather than implicit.

ANALYSING THE COMPETENCIES

Each librarian and business competency consists of a mix of skills, knowledge, understanding, and attitudes. The significance of each of these components varies from competency to competency and according to how the competency is applied in a specific workplace. It is the sum of all of these components that determines an individual's level of competence and how appropriate that competency level is to an organization.

For example, when analysing professional competency #1 - *Expert knowledge of the content of information resources, including the ability to critically evaluate and filter them*, the *knowledge* required for competency includes: products and their content (including format-specific characteristics), client needs and information use behaviours (preferred methods of access etc.), organizational objectives (to enable prioritisation) and the technical infrastructure available for information delivery.

The many *skills* associated with this competency include: information extraction (regardless of format), product evaluation, client needs evaluation, communication, and negotiation (with clients and vendors).

The *understandings* that must be present include: a diverse range of products can deliver similar information, client needs and information use behaviours rarely remain static (and personal preferences can often overrule organizational needs), comprehensive product evaluation can assist prioritization for delivery and budgetary purposes, and that price and delivery and access options are part of the evaluation process.

Attitudes that impact on this competency include: flexibility (to accept that there is often not a 'best' product), that quality is subjective and that our views should often not be forced onto the information users, that our evaluation and filtering can make a significant contribution to people's work, and that when dealing with vendors *we* are the customers and that when dealing with clients *they* are the customers.

By identifying the components of the competency we are able to better see the specific areas where we might need further training and/or development. We are also better able to map the components to the business competencies.

MAPPING THE COMPETENCIES

Once the components of the professional and personal librarian competencies have been identified for a specific environment, they can then be mapped to the business competencies. By crossing the interconnecting cells the relationships between the two sets of competencies can be visually represented (Appendix II).

Identifying the components that comprise the business competencies and then identifying relationships between the components of the competencies (Appendix III) can further enhance this process.

As the relationships vary according to a specific role, a rating system can be used to identify the strength of a relationship. The resulting representation will show a hierarchy of relationships to facilitate the prioritisation of developmental activities.

MODEL FOR SELF-EVALUATION

Once the mapping process has been completed, an individual can then conduct a self-evaluation that facilitates the identification of strengths, weaknesses and gaps. The results of this analysis can then be used to feed into performance reviews and professional development proposals. Individuals are asked to rate their own levels of competency using the following scale of 1 to 5:

5 - I excel at this - it is one of my strengths.
4 - My level of knowledge or ability is adequate, but I wish to excel.
3 - My level of knowledge or ability is adequate in meeting this.
2 - I recognize that I need to improve in this.
1 - I have little or no training towards this, and need it.

The outcomes of the self-evaluation can then be matched against the competency relationships to identify how well an individual's competency level matches that required by an organization. The matching process can also be used to identify the areas where improvements are necessary and to develop a plan for action.

DEVELOPING AN ACTION PLAN

A formal action plan can be developed using the results of the mapping and self-evaluation processes. The plan can be used to identify the actions needed to address shortfalls in both personal and professional competencies. The plan must include the name of the competency, how the competency will be acquired or improved, specific and measurable goals (based on skills, knowledge, understandings or attitudes to be acquired), details of what the process involves (training, mentoring, etc), what will be done by whom and how, how much it will cost and how long it will take.

AUSTRALIAN AND NEW ZEALAND COMPETENCY WORKSHOPS

Many information professionals in the Australian library sector are being forced to evaluate their levels of competency in relation to competencies developed by the business sector and to articulate them in the language of the business sector. To facilitate this process, the Dialog Corporation agreed in 2001 to sponsor the development and delivery of a series of workshops across Australia and New Zealand. The workshops began in Melbourne in September 2001 and are scheduled to run through 2002 in Sydney, Canberra, Brisbane, Auckland, Christchurch and Wellington. Although targeted at special librarians, participants have also included information professionals from academic libraries.

The outcomes of the workshops vary from individual to individual but some general findings have been:

1) all professional competencies have an underlying dependence on personal competencies
2) skills gap analysis (for training and development purposes) must be done at the component level rather than the competency level
3) there is a close correlation between the librarian competencies and the business competencies at the component level
4) the weighting of the components that comprise each competency can vary significantly according to the workplace and the role and responsibilities of the individual
5) adopting the 'language' of the business world can be a significant step towards strategically positioning an information service and raising the profile of an individual
6) once developed, the business competencies can form the basis for position descriptions, performance reviews, personal and professional development programs, training and study programs and team development

As insufficient time is available in the workplace to reflect on many of the issues related to competencies, the workshops provide individuals with the opportunity to step back from their day-to-day responsibilities and take time out to reflect on their positions and roles within their organizations. Most participants were grateful for the opportunity to develop a clearer focus and an action plan for their own future development.

CONCLUSION

For the contribution that special librarians make towards their organizations' success to be recognized and acknowledged it is necessary for the librarian to be regarded as an integral part of an organization. A move towards gaining such a strategic position can be made by approaching the packaging and delivery of information and the promotion of information and knowledge services and products in a way that uses the competencies of the business sector rather than those of librarians. This does not mean adopting new competencies by which to measure ourselves, but rather to map our librarian competencies to a set of accepted business competencies and to articulate how we measure our competency levels in the language of our organizations. This paper has used the SLA competencies, however the process described can be used with any of the sets of competencies that have been developed for specific library purposes or by specific library groups (see examples in the reference list). By describing our competencies in the language of our organizations and by taking responsibility for the development of our own levels of competency in such areas as strategic positioning, packaging, promoting, persuading and performing we are more likely to be accepted as a significant member of the organizational team and acknowledged as being an essential contributor to an organization's success.

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APPENDIX I

MATCHING PERSONAL AND PROFESSIONAL COMPETENCIES

Professional Competencies / Personal Competencies	Committed to service excellence	Seeks out new challenges and sees new opportunities	Sees the big picture	Looks for partnerships and alliances	Creates an environment of mutual respect and trust	Communicates effectively	Works well with others in a team	Provides leadership	Plans, prioritizes and focuses on what is critical	Is committed to lifelong learning and personal career planning	Has personal and business skills and creates new opportunities	Recognizes the value of professional networking and guidance	Flexible and positive in a time of continuing change
Expert knowledge of the content of information resources, including the ability to critically evaluate and filter them													
Specialised subject knowledge appropriate to the business of the organization or client													
Develops and manages convenient, accessible and cost-effective information services that are aligned with the strategic directions of the organization													
Provides excellent instruction and support for library and information users													
Assesses information needs and designs and markets value-added information services and products to meet identified needs													
Uses appropriate information technology to acquire, organise and disseminate information													
Uses appropriate business and management approaches to communicate the importance of information services to senior management													
Develops specialised information products for use inside or outside the organization or by individual clients													
Evaluates the outcome of information use and conducts research related to the solution of information management problems													
Continually improves information services in response to changing needs													
Is an effective member of the senior management team and a consultant to the organization on information issues													

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APPENDIX II

MATCHING PROFESSIONAL LIBRARIAN COMPETENCIES WITH BUSINESS COMPETENCIES

Professional Competencies / Business Competencies	Strategic Positioning	Packaging	Promoting	Persuading	Performing
Expert knowledge of the content of information resources, including the ability to critically evaluate and filter them.					
Specialised subject knowledge appropriate to the business of the organization or client.					
Develops and manages convenient, accessible and cost-effective information services that are aligned with the strategic directions of the organization.					
Provides excellent instruction and support for library and information users.					
Assesses information needs and designs and markets value-added information services and products to meet identified needs.					
Uses appropriate information technology to acquire, organize and disseminate information.					
Uses appropriate business and management approaches to communicate the importance of information services to senior management.					
Develops specialised information products for use inside or outside the organization or by individual clients.					
Evaluates the outcome of information use and conducts research related to the solution of information management problems.					
Continually improves information services in response to changing needs.					
Is an effective member of the senior management team and a consultant to the organization on information issues.					

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APPENDIX III

MATCHING THE COMPONENTS OF A LIBRARIAN COMPETENCY WITH THE BUSINESS COMPETENCIES

#1 Expert knowledge of the content of information resources, including the ability to critically evaluate and filter them		Positioning	Packaging	Promoting	Persuading	Performing
Knowledge	-products and their content					
	-client needs and information use behaviours					
	-organizational objectives					
	-technical infrastructure					
Skills	-negotiation (with clients and vendors)					
	-information extraction					
	-product evaluation					
	-client needs evaluation					
	-communication					
Understandings	-a diverse range of products can deliver similar information					
	-client needs and information use behaviours rarely remain static					
	-product evaluation can assist prioritization for delivery and budgetary purposes					
	-price and delivery and access options are part of the evaluation process					
Attitudes	-flexibility					
	-quality is subjective and that our views should often not be forced onto the information users					
	-our evaluation and filtering can make a significant contribution to people's work					
	-when dealing with vendors *we* are the customers and that when dealing with clients *they* are the customers					

APPENDIX IV

MATCHING THE COMPONENTS OF A LIBRARIAN COMPETENCY WITH THE COMPONENTS OF A BUSINESS COMPETENCY

#1 Expert knowledge of the content of information resources, including the ability to critically evaluate and filter them		Positioning						
		Knowledge				Skills		
		Organizational	Client	Industry	Technological	Communication	Negotiation	Political
Knowledge	-products and their content							
	-client needs and information use behaviours							
	-organizational objectives							
	-technical infrastructure							
Skills	-negotiation (with clients and vendors)							
	-information extraction							
	-product evaluation							
	-client needs evaluation							
	-communication							
Understandings	-many products deliver similar information							
	-client needs and information use behaviours rarely remain static							
	-product evaluation can facilitate prioritization for delivery and budgetary purposes							
	-price and delivery and access options are part of the evaluation process							
Attitudes	-flexibility							
	-quality is subjective our views should often not be forced onto the information users							
	-our evaluation and filtering can make a significant contribution to people's work and the organization's success							
	-when dealing with vendors *we* are the customers and that when dealing with clients *they* are the customers							

Compromises along the Way:
Balancing Speed to Market with Sustainability while Delivering Knowledge Management Services

Martha K Heyman, MLIS
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ABSTRACT

Knowledge management in a consulting firm is where the rubber meets the road. It is where information science standards and guidelines are compromised in favor of business processes and requirements. The challenge is 'exasperated' by the use of a single, shared knowledge asset repository across the firm. The needs and work processes of each practice area within a consulting firm vary greatly. The common technology platform and repository require that compromises be reached between not just information science standards and day-to-day business operations, but also between the different knowledge managers who support the firm's different practice areas. This paper will discuss some of the compromises, and the path to those compromises, which must be made while implementing a successful knowledge management program within a for-profit enterprise. The paper will also briefly contrast the structure of a successful knowledge management program within a consulting firm versus one within a commodities business, specifically a global chemical manufacturing company.

WHY KNOWLEDGE MANAGEMENT?

There is a temptation to assume business value for knowledge management exists just because it has become a business buzzword, as if the presence of a slick term makes business value a fore-gone conclusion. Remember the old adage from your mother: "Just because the other kids are doing it, does not mean you should"? Every organization, whether it is a for-profit enterprise or a not-for-profit organization, must take the time to think for itself. Is there a business case for us to manage our knowledge? That said, however, I would venture to say that if the conclusion from the self-assessment is no, then either the assessment or the thinking is flawed. Certainly no enterprise involving people can be successful, let alone competitive and sustainable, if no attention is given to fostering the knowledge life-cycle. I would argue that that is true whether the enterprise is or is not for-profit. All organizations face competition, unless they are a monopoly. Not-for-profit organizations face competition from other service providers, as well as from the possibility the individual will choose not to use the services. This paper, however, will only discuss knowledge management in the context of a for-profit enterprise.

The business case for formally managing the knowledge life-cycle (i.e. knowledge management) has gotten easier to make, for all types of firms, as the understanding of core competencies has grown. It is generally accepted today that a firm competes and gains competitive advantage based on its core competencies. Core competencies represent the firm's

capacity to create new businesses by creatively combining core skills with new knowledge to form new "knowledge streams".[1] For example, chemical firms need to blend chemistry and chemical engineering with software engineering and electronics so as to automate production operations, while consulting firms must effectively combine classic management consulting with the delivery of cutting edge information technology solutions. Competitive advantage is gained by the ability to become competent in doing this in an environment of dynamic change. To become competent, the organization has to be able to repeatedly learn and transfer the learning to new team members. The ability of the competence to be shared, therefore, is as critical as the other components of a true core competency. A firm must be agile in developing and repurposing core competencies as new business opportunities present themselves. This requires the ability to transfer tacit and explicit knowledge (people-embodied knowledge), and skills (capital-embodied knowledge). "It is the combination of people-embodied and capital-embodied knowledge that represents the totality of the competence base within an organization." (Prahalad p. 241) Classic examples of core competencies include miniaturization at Sony, network management at AT&T, chemical engineering at DuPont, and user-friendliness at Apple.

The business case for knowledge management, therefore, rests entirely on the assertion that purposefully managing the knowledge life-cycle within an enterprise is the critical enabler in fostering the development of new core competencies as well as sustaining existing ones. Without core competencies, a firm has no ability to differentiate itself in the marketplace and will not be viable. For simplicity, this paper will only address the narrow portion of KM that is the management of knowledge assets (i.e. the acquisition and handling of explicit knowledge).

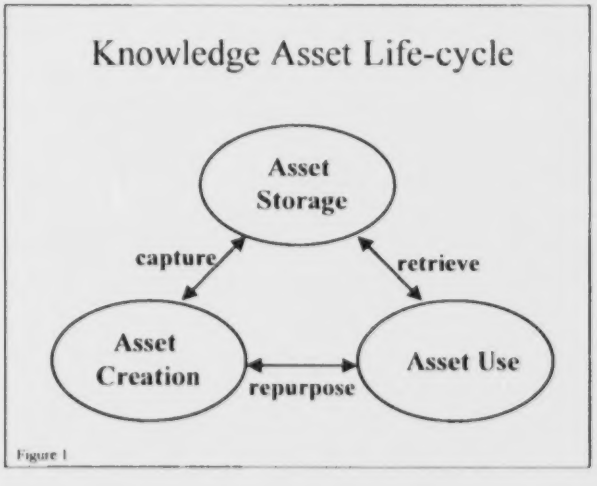

Figure 1

CONTEXT MATTERS

While all enterprises must have core competencies to successfully compete in the marketplace and all enterprises must formally manage their knowledge in order to support the creation and maintenance of those core competencies, there are subtle, yet distinct, differences in the resulting knowledge assets. These differences result in different requirements with regard to standards, methods, and processes for the management of the assets. For example, what makes a

consulting firm different from a chemical manufacturing firm? Without going through the tedium of analyzing the different business models, the difference ultimately is embodied in the difference of the primary knowledge base supporting their core competencies. As Prahalad aptly emphasized, core competencies are derived from the combination of people-embodied and capital-embodied knowledge available to the enterprise. I would argue that the different industries within which firms compete define the viable business models available to the firms, and those business models express the constraints which drive the differences between how knowledge assets are managed in a manufacturing company versus a consulting firm. Not surprising, it is ultimately the distinctly different business drivers that define the look, feel and operability of the knowledge asset management system; form follows function. After all, knowledge management must be targeted to meet business needs, which requires it reflect the manner in which the business operates.

People-embodied knowledge includes tacit and explicit knowledge. Tacit is the elusive, not yet articulated wisdom and knowledge we all have, which has been shaped by our experiences, learning, understanding and intellectual capabilities. Explicit knowledge is articulated and codified understanding in a form capable of being shared and transferred. The life-blood of consulting firms is the exchange between tacit and explicit knowledge. Capital-embodied knowledge is explicit knowledge which may be either internally generated or purchased from external resources. It is a combination of knowledge and skills made explicit to only those within the enterprise (proprietary), and purchased knowledge and skills from external experts. Chemical manufacturing companies rely heavily on capital-embodied knowledge. Patents, trade secrets, technical skills, research & development and strategic partnerships are all critical to the sustainable competitive advantages of chemical companies. So while the chemical manufacturer and the consulting firm each have some degree of business reliance on both people-embodied and capital-embodied knowledge, value-creation by the enterprise depends differently on each type of knowledge.

In addition to the differences in the extent of dependence on the two types of knowledge, different types of firms apply knowledge at different points in the process of value creation. Michael Porter's value chain model maps the creation of value by the firm, starting with suppliers and ending with customers. A typical chemical manufacturing firm creates value as a result of its relationships with suppliers, its raw material procurement efficiencies, the depth and

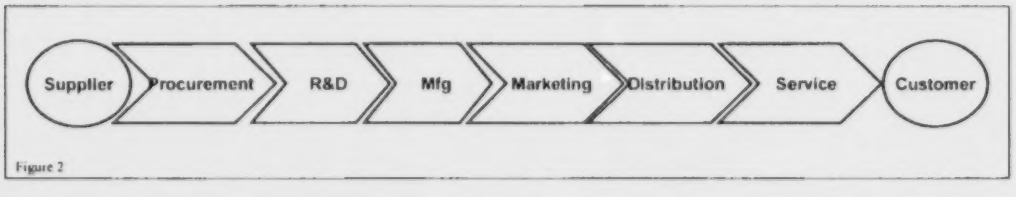

Figure 2

breadth of its R&D (future product pipelines and support of existing product lines), and its manufacturing competencies. On the other hand, and at the other extreme, a consulting firm creates value primarily as a result of the quality of its relationships with its customers. Those relationships are highly dependent upon the firm's marketing skills (proposal development), the ease of service distribution via local offices located globally, and the overall competitive quality of the delivered services. The two types of firms create value at different ends of the value chain.

As a result, the firms rely on different types of knowledge to different degrees (people-embodied vs. capital-embodied), and they create different types of knowledge assets. As a result, the firms have very different system requirements for the creation, capture, storage, retrieval, use and repurposing of those assets; form follows function.

IN THEORY, THERE ARE STANDARDS

Any building can house thousands of books and journals, and any computer can house gigabytes of digitized content, but it is the core competencies of the information science profession that enable users to make sense out of the jumble of information and data. In an ideal world, it is the core competencies of the information science profession that enable users to precisely retrieve the right knowledge for the competitive advantage of the business.

Information Science Core Competencies: Sense-Making Tools

1. Expert knowledge of information resources (content and use)
2. Conceptual analysis (indexing, abstracting)
3. Ability to structure and organize content (information management)
4. Ability to synthesize and customize (information relevancy)

We all learned in library school about the standards and guidelines of collection management, cataloging and classification schemes, as well as the creation and use of thesauri and authority lists. Whether the knowledge assets are in microform, print or digital format, there are standardized work processes to be established and followed with regards to collection management and classification. The intent of the standards is to ensure *sustainability and consistency* of access to the knowledge assets *over time and across disciplines*. The standards are intended to ensure the right content is collected, at the right time, in the right format and stored in a manner facilitating fast and accurate retrieval at the right time. Striking a balance between relevancy and recall during the retrieval process is the ultimate goal. It is as equally damaging for an information seeker to miss critical content because the retrieval set is too narrow, as it is for them to loose precious time sifting through too much content because the retrieval set is too broad. As important as that balance is in an academic or public library, it is that much more important in a corporate setting, where *speed to market* is critical for survival.

For the sake of brevity, we will look at just two of the standardized information processes; content management and content classification. Content management includes defining the scope of the collection, establishing the acquisition guidelines, identifying storage and retrieval mechanisms, and determining retention policies.

- Step 1: Define the Scope of the Collection.
    - Based on business need, what are the primary and secondary subject areas?
    - Do certain topics require greater depth than others?

- Do certain topics require greater breadth than others?
- What are the characteristics that make objects within those topic areas attractive to collect? In other words, how is quality defined and assessed?

- Step 2: Establish Content Acquisition Guidelines
  - Where is the content generated, in what format, and by whom?
  - Will content be purchased, generated internally or both?
  - How will the selected materials be obtained? What processes are required to support the acquisition?

- Step 3: Create Storage and Retrieval Mechanisms
  - Based on expected user access points, where will the collection be stored? Electronic repository, physical library, a combination?
  - What are the various formats for the content? All digital? All print? All microform? A combination?
  - What will the search and retrieval mechanisms be? How will the content be catalogued or indexed? What processes and technologies are required to support storage and retrieval?
  - How will end-users be educated to effectively use the tools?

- Step 4: Determine the Retention Policies
  - Does retention vary by content type? By topic? By author?
  - Do different topic areas have different currency life-spans?
  - If the material is removed from the active collection, is it kept accessible in an "archive" collection?

All of these aspects of content management are relatively straightforward when the collection is associated with an established and relatively static discipline or topic area. Keeping with our comparison, if we consider the collection within a chemical manufacturing firm, we see that the standards and guidelines easily apply with minimal adjustment to business needs. In fact, the print/microform collection at a chemical manufacturing firm looks and operates much the same as a library at a university. The print collection is catalogued using Library of Congress classification scheme. The OPAC follows standard MARC record format. Proprietary research literature is indexed and abstracted. The abstracts are stored in a citation database and searchable at every employee's desktop using Boolean logic. The scope of the collection is defined by the nature of the business: polymer chemistry, chemical engineering, physics, etc. Some sub-disciplines may be more important to the firm, and so may have greater depth in the collection. The knowledge assets in the collection are both internally generated and purchased from external vendors. Retention policies vary based on content type. Proprietary content is permanent, as are the majority of the purchased monographs and reference materials. Periodicals have various retention periods, as determined by the currency of their content. Peer-reviewed technical journals are kept permanently if space is available. Newsletters and trade journals are kept as short as 3 months and up to 24 months as defined by frequency of publication and currency of content. As will be seen later, none of the four steps enumerated above are easily applied "as is" to knowledge asset collections in a consulting firm.

The second standardized process considered here is the classification of content and the subsequent cataloguing or indexing of the material. Conceptual analysis, one of the core competencies of information science, is the process of determining the primary topic(s) embodied in a knowledge asset and then applying the appropriate Library of Congress call number, controlled term, or subject heading. The processes of cataloging and indexing are intended to ensure the content is stored in a manner facilitating fast and accurate retrieval when the material is needed. The use of standardized classification schemes (e.g. LOC), controlled terms from a thesaurus (built to ANSI/NISO Z39.19-199x specifications), or standardized subject headings (e.g. MESH) ensures consistent ability to precisely and comprehensively retrieve content across repositories. The consistent application of classification standards across repositories enables information seekers to apply existing understanding of the scheme to efficiently retrieve content across time and disciplines. Without standards, information seekers would be lost in the unique processes required to retrieve content from each different repository.

Classification standards are relatively straightforward to apply to the collections of knowledge assets at the chemical manufacturing firm. The various branch libraries all use LOC call numbers to catalogue monographs and reference collections. The OPAC, using MARC format, contains LOC subject headings and adheres to AACR. The proprietary document collection is indexed using controlled terms from an evergreen thesaurus. Because the volume of new knowledge assets added to the collection is comparatively low, the conceptual analysis of the documents is efficiently done by information professionals with appropriate scientific domain knowledge. As will be seen shortly, significant compromises must be made in the consulting firm with respect to classification standards and conceptual analysis processes.

IN PRACTICE, THERE ARE COMPROMISES

We expect businesses to have an appreciation for the sense-making tools of information science, but the fact is that they seldom do. To be heard, we need to do more than just assert that our tools transform jumbles of information into usable repositories of knowledge assets. Information scientists must have an appreciation for when standards are called for and when compromises are called for. The first step in generating the business's appreciation for information science core competencies is to demonstrate an understanding of the needs of the business. Applying standards for the sake of applying standards, with no adjustment for business needs, will drastically reduce the ability of the knowledge management system to provide business value. Corporate knowledge bases do not exist just to exist. They exist to meet business needs, and therefore, must be adjusted to ensure reliability, relevance and business value. In a consulting firm environment, this means many compromises are called for.

Despite having extensive experience applying information science standards and guidelines in a corporate environment, to both a digital knowledge base of proprietary research and a multitude of special print & microform collections of published literature, the reality of doing so in a consulting firm environment has been one long lesson in compromising. The chronic, yet welcome, challenge is to find the balance between the standards which will ensure consistent retrieval of content across time and disciplines, and the needs of the business. How to adjust form to follow function? The standardized process and guidelines that work well in a comparatively slow moving business environment (chemical manufacturing) simply can not be

applied in their native format in a fast paced consulting environment. The challenge is in finding a way to apply them so that business processes are supported and not hindered.

As in any corporation, the intent of a consulting firm's knowledge asset repository is to capture the explicit firm knowledge generated during the course of business operations and make it available to support additional revenue generation. The assets are stored in the repository, where information science's "sense-making" tools are applied so as to ensure the content can be retrieved and utilized for the competitive advantage of the business. (Figure 3) In most corporate environments, the standards and guidelines associated with content management and classification can be applied to the knowledge asset repositories with little or no adjustments. For example, a polymer chemist writes a research report discussing their work on a research program, and contributes the document to the repository. The information scientist with polymer chemistry domain knowledge scans the document, indexes it appropriately with controlled terms from the thesaurus, writes an abstract, submits the citation with indexing and abstract to the citation database and finally sends the report to the physical central repository. The indexing will have captured the essence of the content. It will not take into account how someone might utilize the content, what business implications might be inferred, or anything else. As per standardized cataloguing rules, the indexing reflects precisely what is inherent in the document: standard bibliographic citation fields plus the major concepts. In this case, this is primarily because knowledge assets in the manufacturing firm are frequently re-used but rarely repurposed. They are used in the same manner they are created. This polymer chemistry research report will be pulled and reread when it is time to build on the research discussed in the document.

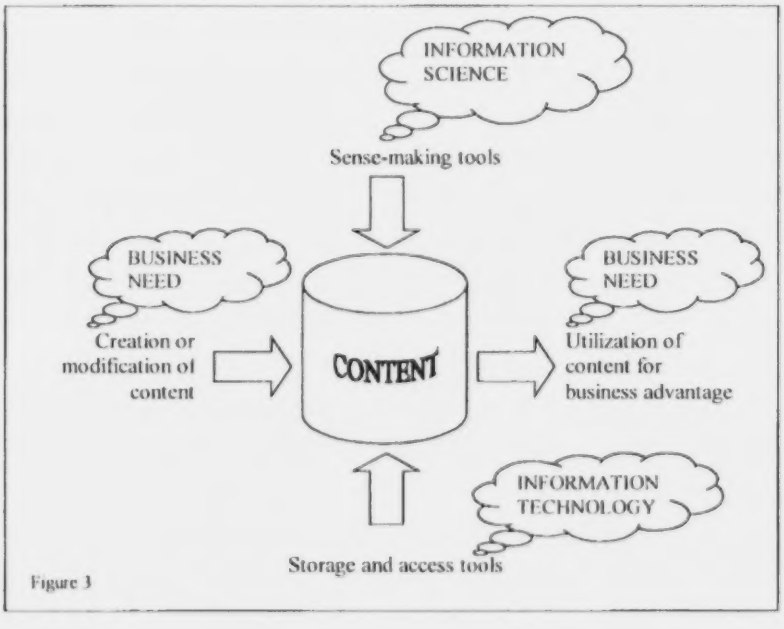

Figure 3

In a consulting firm, however, knowledge assets are repurposed far more often than reused in their native form. Most practitioners take components from various assets in order to

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synthesize new ideas, which are then captured within new knowledge assets. The knowledge asset is rarely valuable in its entirety "as is". Rather, its value stems from the many ways the knowledge in the asset can be repurposed. Portions of the material can be extracted and used in a marketing piece ("we did this sort of work for so-and-so"). Other portions can be combined with bits from other assets to capture the firm's thinking on a specific business issue. There are an endless number of possibilities. In addition, the content generated by one practice area of the consultancy may be of direct relevance and import to one or more other practice areas. However, what creates that value may vary between the practice areas. For example, a sample piece of content may address strategic redesign of the supply chain and implementation of an IT-based solution for a client operating in the aerospace & defense industry. There are a minimum of at least three practice areas (disciplines) to which this content would have direct relevance: strategy, supply chain, and aerospace & defense. Each practice area has "ownership" of the content, has their own spin on it (resulting in different abstracts) and has different retention policies for this single piece of content. The content may be critical to a new service offering in one practice area, and old hat in another. Also, each practice area may repurpose the material in one of three different ways over time. It could be used for project support, research, or sales & marketing. The point is that the knowledge management team for each of the different practice areas could be applying different cataloging and indexing rules, following different retention policies, and writing different abstracts all for the same knowledge asset with a single database record in the central repository. Each team will emphasize the aspect of the content which has the greatest relevance to their constituency group. In the process of entering the asset into the collection, the knowledge managers appear to have compromised on nearly every aspect of collection management and classification standards and guidelines. The standards and guidelines are adjusted to reflect the nature of the content for the practice area, the use of that content, the extent of churn, the level of participation from the practitioners, the level of user sophistication, etc.

COMPROMISE 1: Manage knowledge where it's created, but do that within a global system.

> Stewart emphasized that knowledge must be managed within the context where value is created.[2] In a consulting firm, knowledge and value are created at the practice area level. Yet, if the firm's knowledge was literally managed at the practice area level, the firm would be at a tremendous disadvantage in the marketplace. There would be multiple silos of knowledge in the firm with no cross-fertilization between practice areas. One way to avoid silos is to have a single firm-wide repository for the knowledge assets. This first compromise then triggers the subsequent compromises because of the differing business requirements of the various practice areas within the firm.

COMPROMISE 2: No single scope defined for the mega-collection within the repository, but clear scopes defined within practice area collections.

> The scope of the collection (content type and topic) is an aggregated scope determined by the business needs of the various specific practice areas. Acquisition guidelines and processes are established based on consideration of the knowledge asset creation rate, the workload of practitioners, their ability to access the firm's intranet from remote locations, etc. All of these aspects differ substantially across the practice areas. One area may focus

on collecting only proposals while another may focus primarily on collecting completed project deliverables. One collection is focused on supporting sales efforts while the other is focused on supporting service delivery.

COMPROMISE 3: Inconsistently index content across the entire repository but consistently within a "practice area".

Storage is dictated by the firm requirement that ALL knowledge assets are to be stored in a single firm-wide repository, and so, to some degree the retrieval mechanism, is also predetermined. Practitioners can either use the full-text search engine, or use the handful of captured attributes of the content to browse their way to the knowledge assets. These attributes include client, client industry, document type, geographic region, etc. While conceptual analysis for concept indexing is not done across all practice areas, it is done within some of the areas. For example, the manufacturing practice area periodically generate lists of controlled terms, no more than 5 to 6 "topics of lasting value", and assign those keywords against the content. This additional, consistently applied indexing significantly enhances the precision of content retrieval for the practitioners.

COMPROMISE 4: Follow the money, regardless of the 'true' nature of the asset.

One would expect that at least there would be no need for compromises with respect to the core attributes of the knowledge asset. However, compromises are made here too. One attribute used to index the content is the client for whom the work is done. All clients operate in a primary industry. Yet, the client may not be indexed by their true primary industry. They are in fact indexed by which industry practice is credited with the revenue from that client. For example, a large pharmaceuticals firm may be indexed with the chemical manufacturing industry because the *revenue* from the client is realized by the manufacturing practice area, even though a much more appropriate tag to assign would be 'pharmaceutical manufacturing firm' in the 'healthcare industry'.

COMPROMISE 5: The sky is not always blue, even when it is blue.

Cataloguing and indexing standards require that nothing be inferred about the item being classified. If the project work was done in the manufacturing industry, then it is indexed with 'manufacturing'. It is left to the end-users to have enough domain knowledge to understand that there may be content of equal interest and applicability to their query in the consumer business or health care industries. However, in the consulting firm's repository, this domain knowledge is not presumed. Content is indexed based on not only its inherent characteristics but also based on what might be inferred about the material. So, while the client work was done for a manufacturing client, the industry tags would include all related industries.

COMPROMISE 6: Retain dated content because it is fresh content for other repository constituencies.

Finally, as could be predicted, the retention polices of one practice area often come into conflict with those from another practice area. The content type or the business issue addressed or the client for whom the work was done could be insignificant for the industry practice area, but for the involved competency or service practice area, it may represent either their core competency, a best practice or be cutting edge service delivery. The industry practice area would not want to keep the content long, while the service area may want to keep it for years. The industry practitioners get frustrated because this "bad" hit continues to be returned in their query answer sets, and if it were archived, then the competency practice area would be missing a vital knowledge asset.

Through a consensus process, chronic trade-offs between aspects of information architecture and design, information storage and retrieval, collection development and management, standards and guidelines, and virtual community development are settled upon by the knowledge management teams within practice areas and across the firm. The result is a form of contained chaos that succeeds at supporting business objectives across the firm. In fact, the management of knowledge assets models how the practice areas create, use and repurpose knowledge; form follows function. Almost all client service projects are bid on, won, and completed by multi-practice area teams, with each practice area delivering its own twist to the work.

CONCLUSIONS

I no longer believe that compromising information science standards and guidelines is by definition bad implementation of information science. The success of a knowledge management program in a for-profit setting is determined by the extent to which the program supports and even enhances the firm's ability to go to market (i.e. generate revenue). Success is not determined by the extent to which the system adheres to information science standards and guidelines. Those standards and guidelines have value only to the extent they do not hinder the firm's operations while they ensure the sustainability of the knowledge management system. I would challenge, in fact, that the six compromises noted above are not really even compromises. Instead they represent an iterative process of determining a finer level of granularity against which the standards can be consistently *applied*. Perhaps the only compromises are:

- first recognizing that what we learned in graduate school needs to be applied at the molecular level rather than the level of the organism;
- and second, working across practice area boundaries to find the lowest common denominator against which to apply standards.

The lowest common denominator is not the knowledge asset, but the knowledge captured in that asset. The bits of knowledge embodied in the document are the molecules; the document is the organism.

At first blush, it looks as if there is no information science standards employed in the knowledge asset repository, when in fact there are multiple sets of standards cohabitating. Driving to the lowest common denominator of base standardization leads to the minimization of costs and maximizes flexibility. For example, the volatility of terminology in the consulting industry and the speed at which the business focus can change makes the indexing of knowledge assets in the manner which a chemical firm can, economically infeasible. Nor is there much of a

business case for trying to. Unlike the terminology in scientific disciplines, consulting terminology is both a communications vehicle used to convey concepts and, probably more importantly, a sales and marketing tool. As a result, consulting language has a high churn rate. Supply chain management became value chain management which became vertical management which became collaborative commerce. The cost of re-indexing the material tagged with the older concept would be prohibitive. Even managing a thesaurus that would educate the search engine as to the equivalency of those terms becomes prohibitive, especially when you look at the alternative of simply relying on free-text searching, the end-users' ability to use their domain knowledge to search effectively, and the relatively short life-span of a knowledge asset in a consulting firm (18 months on average), why bother spending the time and money? Consulting firms can not afford to use resources to re-index content and restructure keywords and subject headings when business service offerings and focus change as rapidly as they do in the consulting industry.

The standards and guidelines of information science, therefore, are not really compromised, but the core competencies of information science are challenged to truly demonstrate their value and adaptability. The successful application of information science standards and guidelines to ensure sustainability and consistency of such dynamic and evergreen knowledge bases in fact demonstrates the tremendous business value of such competencies. By implementing information science standards at the level of the lowest common denominator, the rich potential of the knowledge repository is significantly deepened. For example, the finer level of granularity allows the flexibility to selectively repackage individual pieces of content into hyperlinked collections of content that address a current "hot-topic" without disrupting any existing classification or indexing against the various component knowledge assets of this new virtual special collection. The knowledge assets in the virtual collection were not previously related to each other and the business value of the collection may be short lived. As critical focus areas for the firm change, content can be rapidly disassembled and reassembled as needed to assist practitioners in rapidly delivering results to the firm's clients.

Finally, form does follow function in a successful knowledge management system. The level of structure and the degree of constraints within the system mirror the business supported by the knowledge asset repository. The level of granularity against which the standards are applied is dependent upon the nature of the business.

Endnotes

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2. Stewart, Thomas A.; The Wealth of Knowledge. New York: Currency; 2001; ISBN: 0-385-50071-8, p 180.

Compromises along the Way
Delivering Knowledge Management Services in a Consulting Firm

Martha K Heyman, MLIS

Scope of Discussion

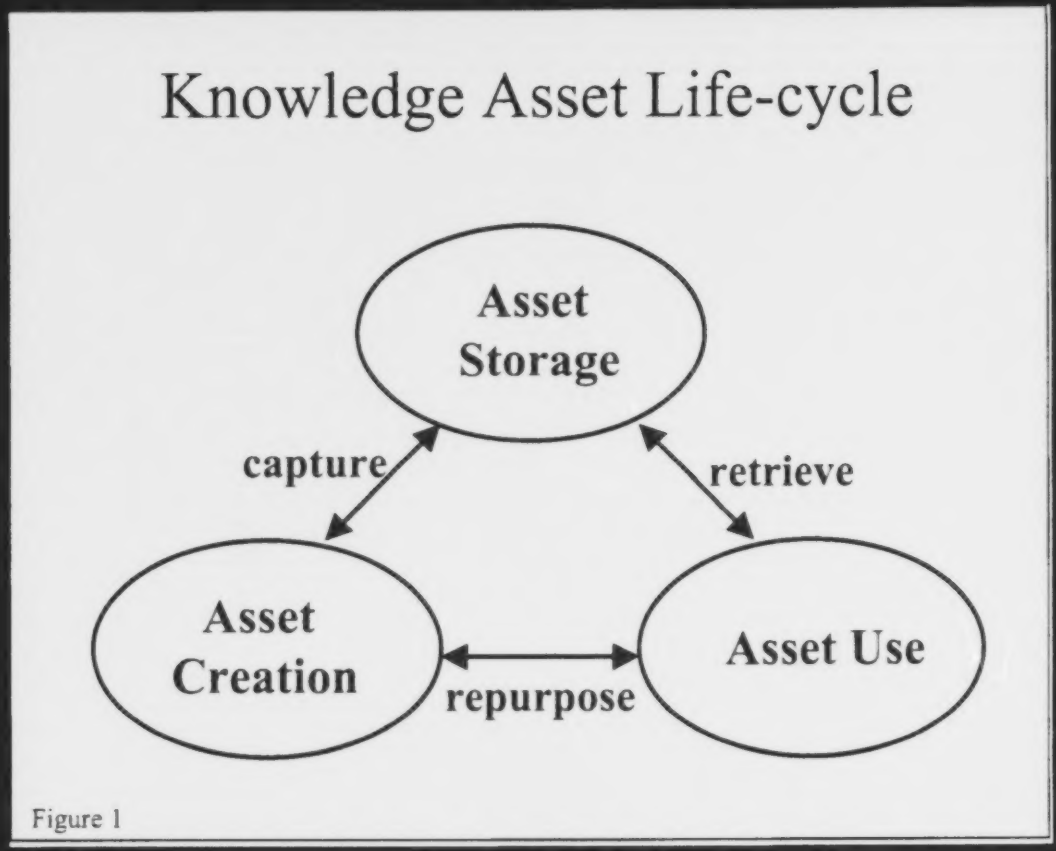

Figure 1

Context Matters –
Knowledge Environment Varies

- Where the firm competes determines business model
  - Different core competencies,
  - Different corporate processes
- Business model constrains how knowledge assets can be effectively managed
  - Determines nature of the knowledge asset life-cycle
  - Influences the nature of the knowledge assets

Knowledge life-cycle varies

- **Consulting Firm**
  - High rate of creation
  - Closely linked with revenue generation
  - Short-term value
  - High churn
- **Chemical Manufacturer**
  - Slow rate of creation
  - Distant link with revenue generation
  - Long-term value
  - Slow turn-over

Characteristics of knowledge assets vary

- **Consulting Firm**
  - Repurposed
  - Rarely used "as is"
  - Knowledge components more valuable than total asset. (Parts are greater than the sum of the parts.)
- **Chemical Manufacturer**
  - Rarely repurposed
  - Frequently re-used
  - Complete asset more valuable than the components (Sum is greater than the parts.)

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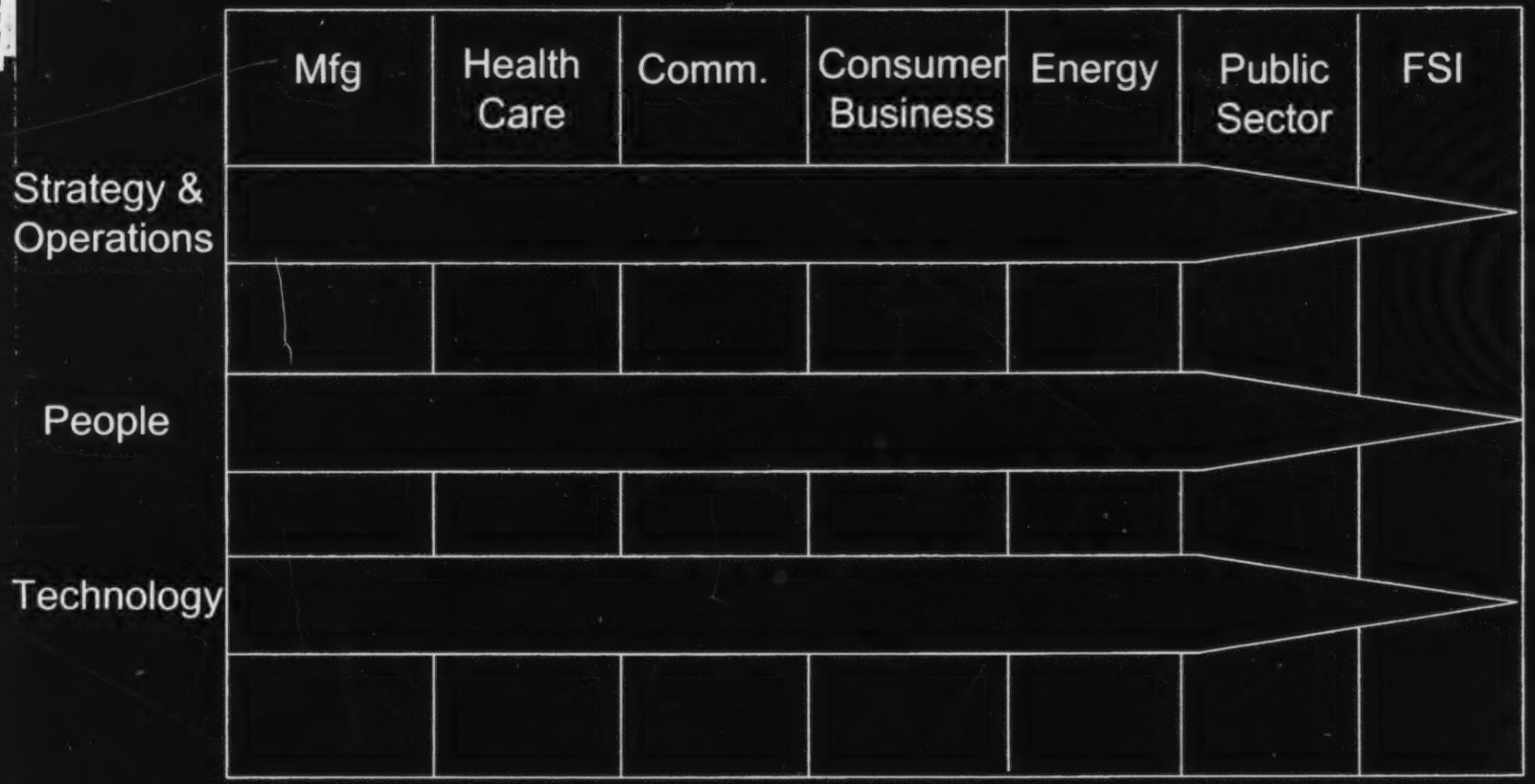
Consulting Firm Structure

Seven industry practice areas



In Theory, There are Standards

- Intent is to ensure….
  - sustainable and consistent access to the knowledge assets over time and across disciplines
  - the right content collected, at the right time, in the right format and stored in a manner facilitating fast and accurate retrieval at the right time

Compromise One

Manage knowledge where it's created, but do that within a global system.

- Knowledge and value are created at the practice area level
- If literally managed at the practice area level there would be
  - multiple silos of knowledge in the firm with
  - no cross-fertilization between practice areas.
- Avoid silos by using a single firm-wide repository for the knowledge assets.

Compromise Two

No single scope defined for the mega-collection within the repository.

- Scope is an aggregation of the practice areas' business needs
  - One area may focus on collecting only proposals
  - Another may focus on completed project deliverables
  - First collection focused on supporting sales efforts
  - While the second focused on supporting service delivery

Compromise Three

Inconsistent indexing of content……

- Inconsistent use of meta-data fields
  - Author vs. Content Owner
  - Content Type
- A few practice areas assign controlled terms to their content
  - But each does it differently
  - And the terms are not generally known outside the practice area

Compromise Four

Follow the money, regardless of the 'true' nature of the asset.

- Indexed based on which Practice Area is credited with the revenue
- A large pharmaceuticals firm indexed to:

Manufacturing<Process<Chemicals

rather than

Health Care<Life Sciences<Pharmaceutical Manufacturing

Compromise Five

The sky is not always blue, even when it is.

- Ideal:
  - Content primarily discusses manufacturing issues, so it is indexed with ‘manufacturing’.
- What really happens:
  - Content is also indexed based on “who might want to see it”
  - Content is tagged to manufacturing and consumer business

Compromise Six

Retain outdated content because it is fresh content for someone else.

- Work could be insignificant for the industry practice area,
- Work may represent either
  - the core competency,
  - a best practice
  - or be cutting edge service delivery

  for the competency practice area.

Barely Contained Chaos

- Consensus process
- Trade-offs between practice area needs
- Succeeds at supporting business objectives across the firm

Why Does it Work?

- Not really compromises – iterative process to identify a finer level of granularity
- Standards applied against knowledge "packets" within the knowledge asset, not against the asset itself
- Multiple sets of standards cohabitating
- Minimal costs, maximum flexibility

E-Training: Meeting the Users on Their Terms

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ABSTRACT

The National Institutes of Health (NIH) Library has developed a web-based training program in response to feedback obtained from a customer survey on learning preferences. A majority (50%) of the participants surveyed preferred web-based training over hands-on training (18%), seminars (13%), printed guides (9%) and personal tutorials (9%). Participants reported that they felt overwhelmed by the amount and complexity of information, and specifically reported that they did not need or want to know how to use all resources simultaneously, but would rather learn how to use a resource when the need arises. Taking these user requirements into consideration, the Library's Instruction Team designed and implemented web tutorials to meet the users' expressed desire for convenience and the ability to learn at their own pace from anywhere at anytime. As a first step, the team investigated coursebuilding software and decided to use a web-authoring tool called ViewletBuilder. With ViewletBuilder, the team developed practical, task-specific animated demonstrations or "viewlets". The viewlets show a user how to use Library-supported databases or software such as Reference Manager, a popular bibliographic management package used by NIH researchers. Viewlets supplement animation with text balloons and notes explaining the actions to the viewer. Watching a viewlet is like watching a real-time demonstration with navigation buttons for the user to control the speed of the tutorial, allowing the viewer to work at his or her own pace. With web-based training the NIH Library has been able to deliver a 24/7 learning solution that is both convenient and relevant to the users' information needs in a research environment.

THE NEED FOR WEB-BASED TRAINING

The NIH Library has a longstanding reputation for and commitment to excellence in the NIH community. We have cultivated a good reputation among our users for providing much needed information, document delivery, electronic resources, and instruction in the use of electronic resources. As the NIH Library has developed an increasingly strong virtual presence with thousands of online journals, full-text books and databases, and library users are increasingly utilizing these electronic resources through the Library's web site, the NIH Library Instruction Team has recognized a growing need for web-based instruction as well.

In recent years the NIH Library Instruction Program has consisted of a twice-monthly day-long series of seminars that are offered in house. Our instruction program also includes personal or group tutorials that are offered to the user in their lab or office, or in the Library. We offer on and off-site training for large or small groups. Seminars include instruction in searching biomedical databases such as PubMed and Web of Science, using bibliographic management software such as EndNote and Reference Manager, and special interest classes such as PDA Resources and Nursing Resources.

A number of factors led us to the decision to offer web-based instruction in addition to seminars, tutorials and group presentations.

- Many NIH Library users are located in buildings that are not on the main campus. For these people web-based instruction would provide ease of access and save time traveling to the NIH Library. In meetings conducted with NIH Library user focus groups in May of 1999, off-site users said coming to the library was inconvenient. One participant in the focus groups put it succinctly, "Are classes online or do we have to walk in? Online is much more convenient."
- NIH staff surveyed also reported that they sometimes felt unable to keep up with or overwhelmed with the amount of new resources and the complexity of using them. They needed to be able to learn how to use a resource at their own "point of need". Access to training "on demand" from anywhere at anytime would offer our users training experiences that could be easily accessed for later reference.
- In a telephone survey of 400 NIH staff conducted in January of 2000, a question was included which asked NIH staff, "what is the best way for you to learn about electronic resources and how to use them effectively?" In the response, a majority, (49.8%) of the participants preferred web based instruction, 18% preferred hands-on instruction, 12.5% preferred seminars demonstrating a resource, 9.8% preferred printed guides, and 9% preferred personal tutorials.
- Finally, we hoped that the addition of web-based training would increase the number of users participating in electronic resource instruction offered by the NIH Library.

EVALUATING METHODS FOR DELIVERING WEB-BASED TRAINING

With an understanding of our users' need for training that would provide a convenient way of learning how to use library resources, the Library's Instruction Team began the process of implementing a program by first evaluating the methods for delivering web-based training. Feedback from our users indicated they did not want complicated or time-consuming learning modules – and that they preferred quick overviews to get them started using the resource right away. We also took into consideration the needs of our team members who would be developing the web-based training program. Because of time constraints and relatively little experience with web-based instructional design, we decided we would need software that would afford us a relatively short learning curve and low maintenance schedule.

To adequately evaluate methods for delivering web-based training, we developed a list of features we deemed necessary to satisfy both the users' and developers' requirements. These features included:

For the user:

- 24/7 access for users
- Accessible from any computer
- Easy navigation
- Just-on-time delivery of training

- Fun and interactive experience
- Ability to give feedback and ask questions
- ADA compliant (a requirement for federal government web sites)

For the Library:

- Relatively short learning curve for developers
- Compatible software across computer platforms
- Company infrastructure for ongoing support
- Web-based software
- Ability to be maintained on Library's server
- Easy to update content
- Affordable cost

There are many methods and techniques for delivering web-based instruction. We first identified essentially three types of delivery methods. They included: 1) web pages written in HTML, 2) web pages written with authoring tools that incorporate languages such as Java and JavaScript to develop complex interactive web pages (i.e. Macromedia Authorware, ViewletBuilder), and 3) "off- the-shelf" coursebuilding software that is used to create training modules (i.e. Toolbook, Digital Trainer, Blackboard). After weighing the pros and cons of each category, we decided that the second category of web authoring tools would be most appropriate for the needs of both the user and the developer. While products in the third category, such as Blackboard offer a greater number of interactivity features such as quizzes and student tracking capability, we felt that this type of software was too complex for our needs at the time. Finally, after reading reviews (1-14,17,18) and talking to colleagues in other libraries, we decided to evaluate the following web authoring tools: Macromedia's Authorware, Macromedia's CourseBuilder and Qarbon's ViewletBuilder.

Several members of our team who have advanced web authoring skills evaluated the Macromedia products. Although these products are highly sophisticated and possess many advanced features, we agreed that these products would be more suited for creating complex training modules – something our users have indicated they do not have time for. We also acknowledged that we would need to invest a significant amount of time and money to train team members on how to use the Macromedia tools, and this was not a realistic goal for a team-based activity at the time. We finally decided to use Qarbon's ViewletBuilder as it met all of the essential requirements, particularly with regard to ease of use for the user and the ability to deliver point-of-need instruction to the user. We launched a pilot tutorial or "viewlet" as the tutorials are called, and sought feedback from library staff. With overwhelming positive feedback from staff, we implemented a plan to produce a series of tutorials based on user demand.

THE VIEWLET

Qarbon's ViewletBuilder is an intuitive interface that quickly enables production of a fairly rich animation. Creating a viewlet starts with creating a series of screenshots. Thumbnails of the screenshots are displayed within ViewletBuilder.

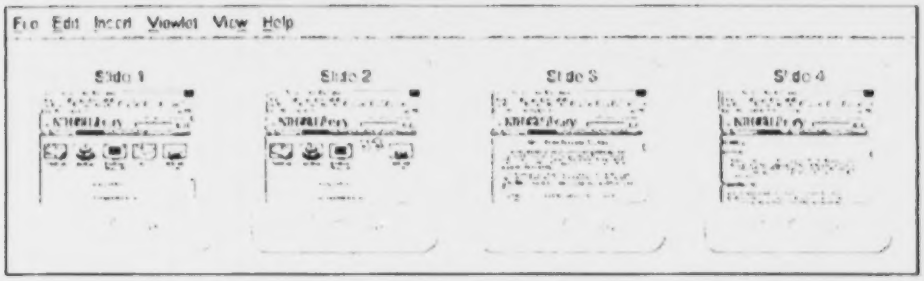

Figure 1 – Thumbnails within ViewletBuilder

These screenshots are then annotated by the use of "notes" and "balloons". Notes are used to give general information about a screen, and are graphically represented by a colored square anchored by a pushpin. Balloons point to a section of the screen and can be used to call attention to a specific part of a screen, for instance a search box where type would be entered or a button that would execute an action. Balloons can be configured to "point" from a variety of positions along its edges. Balloons and notes can be modified by changing their sizes, colors, shapes, and the type format.

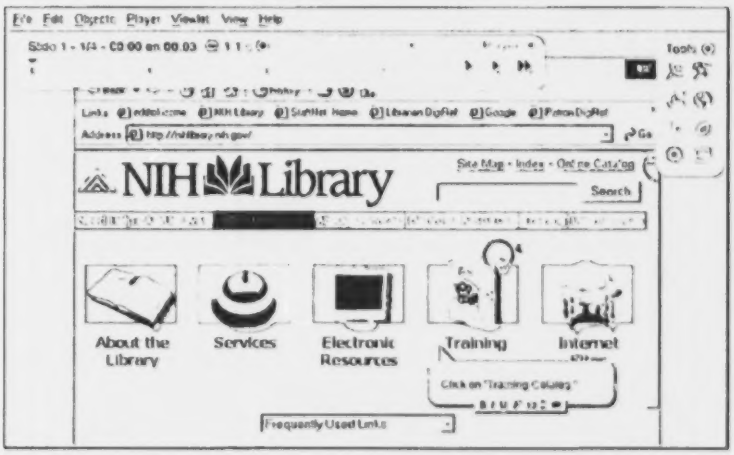

Figure 2 – Configuring a balloon in ViewletBuilder

Feedback from our pilot study yielded many helpful suggestions in terms of formatting considerations for our developers. Suggestions from our pilot users prompted us to standardize the viewlets by adding a first slide displaying the Library's logo, followed by a series of slides that explain how the navigation buttons work on the viewlet's control panel. In addition, we have personalized the look of the viewlets by using our own skin, or branding, rather than the Qarbon logo. By creating a skin, specific colors can be chosen, and a logo or graphic added that is displayed the entire time the viewlet is running.

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The use of cursor movements greatly enhances the viewlets when demonstrating how to navigate through web pages. For our developers, getting the cursor movement correct was the steepest part of the learning curve. As seen below in Figure 3, the cursor appears within a green circle in the screenshots. You will also notice a green and red line, and a red circle. The green circle indicates where the cursor appears on the slide in the viewlet. The green and red line is the cursor path, and the red circle indicates the cursor location on the next slide in the viewlet. This enables a smooth transition between slides.

Figure 3 – Cursor paths in ViewletBuilder

Viewlets can be made more interactive with the use of click zones. The click zones allow creation of self-tests for viewers. Messages are generated based on mouse click location. If the viewer clicks the correct section of the screen, they will get a success message. If the clicked location is incorrect, they will see an error message. Another way to build a self-test for viewers is to incorporate a text zone within a slide. The text zone requires a typed response from the viewer. You may specify how many chances the viewer has to try to get the right response. If the viewer supplies the right response, or the specified number of attempts is reached, the viewlet moves on. We plan on implementing this feature in future viewlets.

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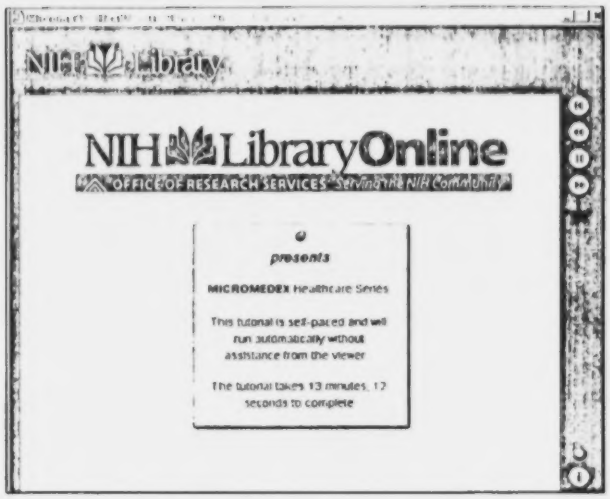
NIH LibraryOnline
OFFICE OF RESEARCH SERVICES
presents
MICROMEDEX Healthcare Series
This tutorial is self-paced and will run automatically without assistance from the viewer
The tutorial takes 13 minutes, 12 seconds to complete

Figure 4 – First slide of a viewlet

The resulting animation is easily used by the viewer. There is a control panel that allows the viewer to pause the viewlet, advance it slide by slide manually, or go back to the beginning. The buttons mimic standard buttons on electronic devices such as CD players and VCRs. The timing of the progression of slides is automatically calculated based on the number of words in the balloons and notes, cursor movements, and any manual adjustments to slide duration. The viewer can control the progression in two ways: by pausing the viewlet with the button at the top right, then advancing the slides one at a time by clicking on the Forward button. The second way is via a pause zone, a feature we do not use. A pause zone will pause the viewlet and insert a button onto the slide, which the viewer must click to continue.

Users can also be directed to other web pages via live URLs embedded in the viewlet. We use this functionality to direct users to a survey that gives us feedback on the viewlet for the resource being discussed, and also solicit suggestions for other viewlets that would be useful.

For the most part, viewlets pose little technological strain on the user. No plug-ins are needed for viewing, and the viewlet played is a streaming file. However, viewlets do not run well on Macs, as they are a Java application and the Mac – Java relationship is not reliable at present. Developers at Qarbon are working with Apple to create a new version of ViewletBuilder for the MacOS X (16).

Narration adds an element that has proven popular with our users. ViewletBuilder prompts the viewer to read the text that is on the balloon or note. The narration not only adds to the experience of watching the viewlet, but also enables the Library, as a federal agency, to comply with Section 508 of the Rehabilitation Act of 1973 by supplying narration for material that is dependant on visual ability. Section 508 establishes standards to ensure electronic and information technology developed, procured, maintained, or used by the Federal government be accessible to people with disabilities (17). Generally, this refers to the use of text labels or descriptors for graphics and certain format elements, but also addresses the usability of

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multimedia presentations, image maps, style sheets, scripting languages, applets and plug-ins, and electronic forms.

EVALUATING THE VIEWLETS

To date, we have received many positive comments that support our effort to develop web-based training that meets the users' on their terms. As mentioned previously, at the end of each viewlet we ask our users to complete a survey that provides us with feedback on the tutorial they have just viewed. Notable in the feedback are comments regarding how quick and easy the tutorials are to follow. Comments include ones like these:

> "So helpful and clear! I spent just 10 minutes and I'm able to use Reference Manager easily!"

> "The tutorial was very well presented and extremely informative in terms of covering the basics…I look forward to using this tool as a part of my research."

We also use statistics gathered from our web site statistical reports to analyze usage of the viewlets. These statistics show the overall picture of tutorial usage as well as specific trends, such as the most heavily used tutorials. Currently, we have 10 viewlets posted on the Training Catalog page of the NIH Library's web site at http://nihlibrary.nih.gov/training.htm. The most popular three viewlets are: 1) Reference Manager, 2) Cited Reference Searching, and 3) How to Order Documents via PubMed.

While statistics give us much information about overall use of the viewlets, there is still a great deal we must learn about the quality of the users' experience while viewing a tutorial. In the future, we plan to use evaluative tools, such as usability testing and focus groups to obtain a greater understanding of the users' actual experience while watching a viewlet, as well as information on the impact of the tutorials on our users' work productivity.

CONCLUSION

With web-based training, the NIH Library has been able to deliver 24/7 training that is both convenient and relevant to the users' information needs in a research environment. We now reach more users as shown by statistics gathered for training delivered electronically or outside the Library. Fifty-one individuals attended training sessions held outside the Library in the Fall of 2000 before the introduction of online training, while 768 received training online or outside the Library during the same period in 2001. We believe this increase of 1406% in training sessions demonstrates a significant and improved return on investment for the Library. A positive impact can be seen not only in the use of the tutorials but also in other services, including increased traffic to electronic resources on our web site.

In the future, we will plan to pursue activities in three major areas. First, as previously mentioned, we plan to conduct usability studies in order to gain a greater understanding of our users' experience with the tutorials. Second, we plan to continue investigating web authoring technologies as they evolve for possible consideration as improved delivery methods of online

training, and third, we plan to further integrate these point-of-need tutorials with other services and resources that are provided via the Library's web site. One of these services is digital reference service, which we are currently piloting with our users. With its ability to push specific web pages to users, digital reference service would be a natural and logical vehicle for providing real-time, personalized assistance that the tutorials are designed to provide.

Finally, we believe the NIH Library Instruction Team has made a significant contribution to achieving one of the Library's strategic goals of providing customized information services and transparent access to the most relevant information for its users. We have recognized that while information itself is essential, the format and mode of delivery are equally as important. Therefore, the NIH Library Instruction Team will continue to play a critical role in developing innovative ways of delivering training services that provide responsive and customized information services to NIH researchers and scientists.

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Globalization in a Biopharmaceutical Company
Serono's E-Library Project

Maria Concetta Audino, Serono Italy
Maria Baez, Serono Spain
Denise Carter, Serono Corporate–Geneva
William MacDonald, Serono US

THE COMPANY

A fully integrated global biotechnology company, Serono specializes in the development and marketing of innovative therapeutics. A world leader in reproductive health, the company is also dedicated to the fields of growth, metabolism and neurology. Since the 1980's, Serono has increasingly committed its resources to the research and development of pharmaceuticals using recombinant genetic engineering.

Serono is the world's third largest biotechnology company on the basis of 2001 revenues of $1.38 billion. The company has over 4,300 employees in 45 countries and state-of-the-art facilities in the U.S., Switzerland, Italy and Israel. The company operates world-class manufacturing facilities in eight countries. Serono products are sold in over 100 countries.

THE LIBRARIES -- HISTORY

Serono's global library capabilities reflect the development of the company. Efforts to globalize library resources and services were initiated by the Serono librarians even though there was no central library structure or administrative directive.

The largest Serono library until the 1990's was located in Rome. A six-person operation provided both print and online services. Even though it was the primary resource for the global company, it did not function as a central library from either a budgetary or general administrative viewpoint. Before the advent of electronic journals, the slow pace of international mail delivery doomed any concerted effort at international collection development. The United States established a one-person library in 1984, but inter-library cooperation remained informal until the Rome Library was downsized in a 1991 corporate restructuring. Subsequent interaction among the Serono librarians was limited until the mid-1990's.

In 1995, a one-person Corporate library was established in Geneva under the Scientific Publications Department. Early in 1996, Serono librarians from the subsidiaries — U.S., Spain, Italy, U.K. — met to identify common areas of concern and possibilities for synergy. Progress

was limited as the subsidiary libraries were all essentially one-professional operations designed to address local needs and funded by local budgets. The technological infrastructure (e.g. global Intranet) to support concerted action was not yet readily available. The primary benefit of the meeting was the opportunity to network, but no permanent advantages were realized.

In 1998, Serono further bolstered its research capabilities through the acquisition of the Serono Pharmaceutical Research Institute (SPRI). This research center specializes in the discovery of proteins and small molecules as therapeutic agents acting on novel targets in key diseases. The Institute's library and information service functions were the largest in Serono, bolstering both Serono's discovery efforts and the resource strength of the company libraries. SPRI scientists worked closely with their American colleagues at the Serono Reproductive Biology Institute (SRBI), a research facility which also drew local information support from the U.S. librarian. This collaborative effort led to a closer working arrangement among the librarians, since the two research centers' common needs led the SPRI librarian and senior information officer to negotiate database and electronic journal licenses which crossed geographical boundaries. In a number of cases, these licenses were extended to other sites beyond the two research centers.

The librarians from Corporate, SPRI and the geographic subsidiaries produced a union list of serials in 1999 and attempted to negotiate a common journal subscription agreement. Several serial vendors were interviewed, with the emphasis placed on the vendors' ability to provide superior worldwide service. Unfortunately, the low overall volume and the selected vendor's varying pricing strategies in different countries promised a price increase for some libraries and a decrease for others — effectively sinking the plan for a negotiated global pricing structure. However, the selection of a single vendor was an important milestone in adopting common practices. The individual librarians were striving for synergy — sharing expertise and providing mutual support. For example, the librarian from Spain visited the U.S. site on two occasions, sharing expertise and ideas, while the librarian from Italy distributed her literature update ("Compendium") worldwide through the Corporate library. However, the early limitations of the company intranet, the size of the individual libraries, and the absence of a common administrative structure or budget hindered these efforts.

The situation improved with further reorganization in 2001, when the Corporate and U.S. libraries became part of the renamed Medical Communication Services group. This new medical services unit included Medical Information, Medical Writing, Scientific Publications, and these two libraries. This reorganization provided a shared administrative and budgetary platform for coordinated development, as well as promoting a natural alliance with similar functions within Clinical Development.

E-LIBRARY

The term "e-Library" assumed dual meanings as the digital library situation developed within Serono. The term was adopted to describe the development and implementation of shared library solutions, but it also applied to a specific IT project intended to automate the Corporate and U.S. library technical services. As the IT project manager stated, "The e-Library project... is

aimed to optimise the Serono employees access to internal and external resources, through the intranet, and support the library daily operations." A survey was distributed to the other Serono libraries to identify other areas of possible future application. The project also served to form a basis for continuing cooperation between IT and the libraries, an important consideration in the provision of multinational electronic resources.

Projected benefits included:

- Client time saved by accessing library resources electronically
- Staff time saved on ordering documents
- Associated cost saving per document if staff cost is reduced
- Provide platform for global licensing of electronic journals and shared global collection development
- Promote visibility of library and familiarity with available information resources
- Lessen likelihood of the client missing a vital information source for a given project
- Provide platform for access to new library resources and services
- Less duplicate ordering of material
- Possibility to charge-back some costs directly to the customer
- Statistics automatically generated, to assist with future resource allocation

The project's focus on document delivery has expanded to address the frequent source of the document request — the literature search. In this area, the history and needs of the Corporate and U.S. libraries varied significantly. The U.S. library had traditionally emphasized its search intermediary role — in many ways, a search service with an associated book/journal collection. The Corporate library had emphasized document provision, providing end-user access to databases. Even the primary vendors varied — the U.S. primarily used Dialog, Corporate primarily used OVID. Both sites require compatibility with a shared Reference Manager database. The SPRI Senior Information Officer also offered end-user access to various databases. The Information Officer has worked with the Corporate library to expand access to OVID, with the local librarians providing any necessary training.

The Medical Information providers in the Medical Communication Services group also expressed a need for online access. In response, the Corporate and U.S. librarians developed and delivered a training session at the worldwide Medical Information meeting in Geneva in November 2001. Medical Information is developing its own information system, with the libraries positioning themselves to provide continuing access and/or training as necessary.

Finally, the further development of the global intranet should greatly facilitate the globalization of Serono's library resources and services. At this point, the Corporate and U.S. libraries share a library site on the Corporate intranet. However, a local U.S. site is required to provide both to provide local information and to drive customers to the common site. The global intranet will also facilitate the development of cooperative projects among the subsidiary libraries. To date, globalization among the geographic subsidiaries has been limited to the identification of respective areas of strength and expertise and the compilation of union serial lists. A general Serono librarian and information provider meeting in Geneva last November, attended by personnel from Corporate, SPRI, the U.S., Spain, and Italy, was designed to promote

networking and facilitate cooperative efforts. The shared intranet will be the key to ongoing communication and a common platform for union lists and other shared resources.

Finally, the shared administrative structure has facilitated the development of a joint Corporate/U.S. mission statement:

- To support the Company's mission by providing Serono employees with access to task-related, published information and knowledge in a timely and cost-effective manner. Provision of access is provided in an appropriate format — print, electronic, multimedia — both proactively and upon request.

- We are fundamentally committed to continual improvement in the quality of service and responsiveness to our customers' needs.

So where does that leave us? It leaves us with a decentralized effort based on the initiative of the individual librarians. Even the term "globalization" assumes a different meaning within the Serono context. The Serono approach encourages shared solutions when desirable, but also recognizes the value of autonomy — local, specialized approaches to meet local, specialized needs. The Corporate and U.S. libraries belong to the same administrative group, but they serve different clientele and maintain separate budgets. There is no worldwide library committee, task force, or directive requiring (or explicitly supporting) this effort. No librarian is coerced or pressured to participate in any shared initiative. Even the development of this presentation, while initiated by one or two of the participants, was a collaborative, voluntary effort. Yet the movement has continued because of shared concerns and an abiding sense that our long-term best interests, both as information professionals and Serono employees, will be best-served by identifying and taking advantage of the synergies offered by this opportunity.

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Globalization in a Biopharmaceutical Company Serono's E-Library Project

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SLA, Los Angeles, June 10th 2002

Serono -- The Company

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- A fully integrated global biotechnology company.
- World leader in Reproductive Health.
- Also dedicated to the fields of Growth, Metabolism and Neurology.
- World's third largest biotech company based on 2001 revenues of $1.38 billion.
- Over 4,300 employees in 45 countries.
- Serono products are sold in over 100 countries.

Serono Libraries -- History

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Mid-1990's efforts to globalize library resources and services initiated by Serono librarians.

Italy-
the first
library

Spain
1984

U.S.
1984

Corporate (Swiss)
1995

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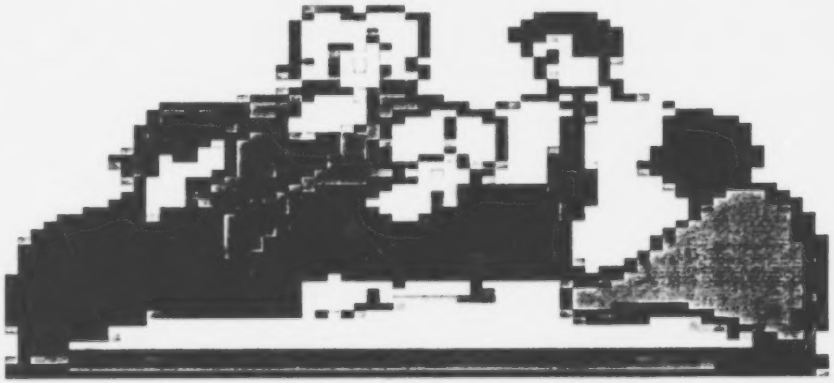
Serono Libraries -- History



1996 The first worldwide Serono librarian's meeting.
Helped promote the networking opportunities available to us.

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Serono Libraries -- History

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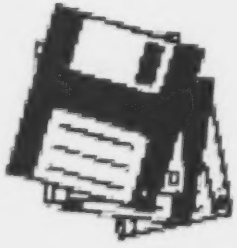
1998 Second Swiss library, with acquisition of Serono Pharmaceutical Research Institute (SPRI).



History of E-products.

Database and electronic journal licences which cross geographical boundaries.

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Early Milestones

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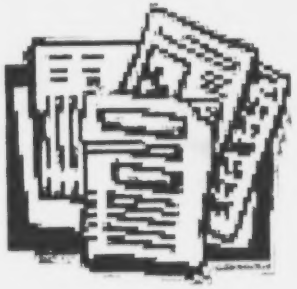

1999, USA, Swiss, Italian and Spanish libraries attempt common journal subscription agreement.

Selection of single vendor was important milestone in adopting common practices.

Early Milestones

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Italy distributes its Literature Update worldwide.

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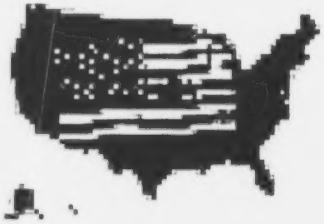

Holà!

Spain visits U.S. to share expertise and ideas.

Early Milestones

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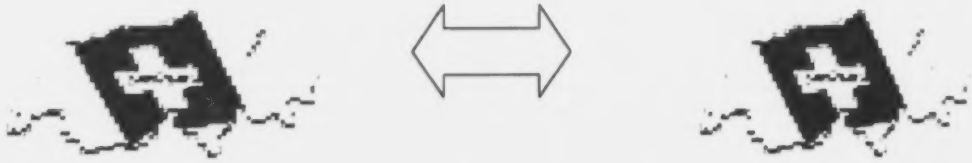
SPRI

Corporate



1999/2000 Swiss libraries use same end-user database provider.

2001 U.S. library also adopts same provider.

Early Milestones

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2001 the Corporate (Swiss) and U.S. libraries became part of the renamed Medical Communication Services group. First time two libraries report to the same management and share a budget.

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E-Library

E L I B R A R

The term E-Library assumes
dual meanings as the
digital library situation
develops within Serono.

E-Library project:
Document Delivery.

Libraries working
together
on shared solutions.

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E-Library -- Document Delivery

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«The e-Library project…is aimed to optimise the Serono employees access to internal and external resources, through the intranet, and support the library daily operations.»

Serono IT Manager for the E-Library project

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E-Library -- Document Delivery

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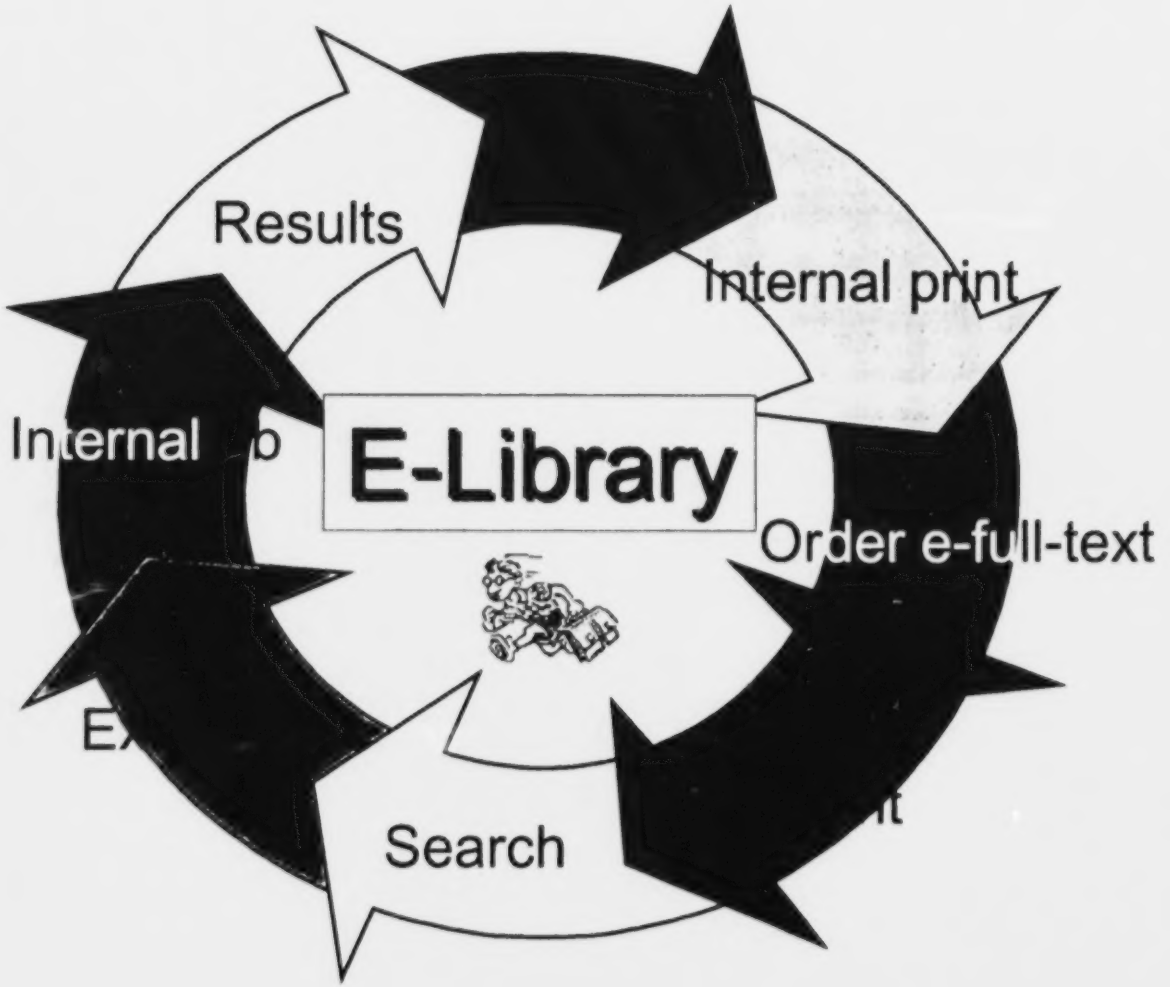

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E-Library -- Document Delivery

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Projected benefits included:

- Client time saved by accessing library resources electronically.
- Staff time saved on ordering documents.

- Associated cost saving per document if staff cost is reduced.
- Provide platform for global licensing of electronic journals and shared global collection development.
- Promote visibility of library and familiarity with available information resources.

Continued/...

E-Library -- Document Delivery

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Projected benefits continued:

- Lessen likelihood of the client missing a vital information source for a given project.
- Provide platform for access to new library resources and services.
- Less duplicate ordering of material.
- Possibility to charge-back some costs directly to the customer.
- Statistics automatically generated, to assist with future resource allocation.

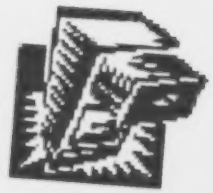
E-Library -- Libraries working together

serono

Document delivery practices
vary from library to library but the
IT project helps focus where they
can come together and where it is best
they remain different.

The document delivery project expanded to
address literature searching.
Again there were differences,
but we have worked on the commonalities.

A worldwide Reference Manager
has been developed to handle
document references.



E-Library -- Libraries working together

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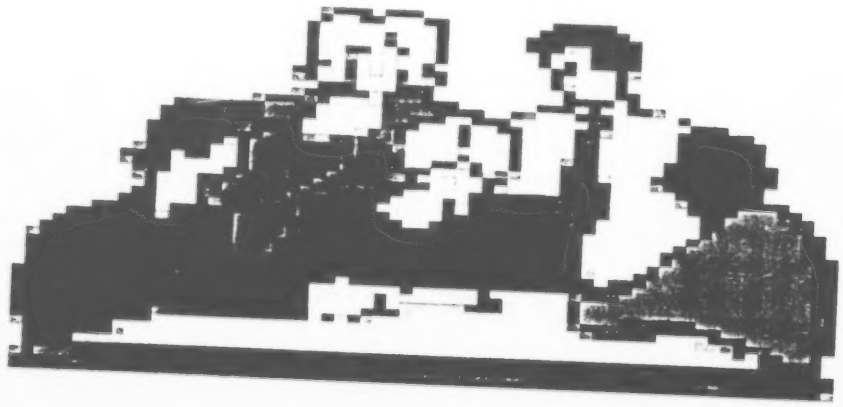
2001 The second worldwide Serono librarian's meeting.
Key topic: What would we put on a shared intranet site?



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E-Library -- Intranet developments

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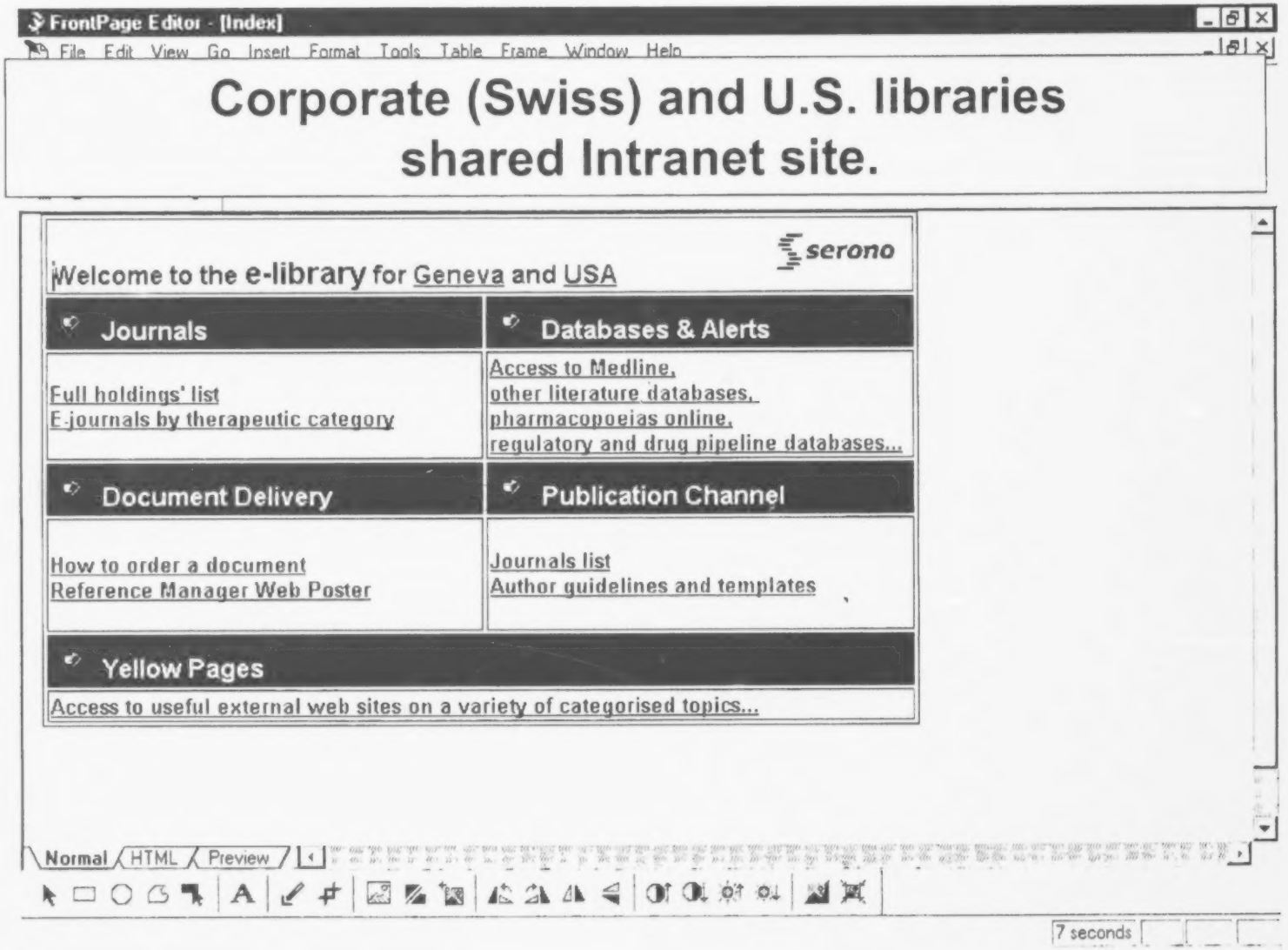
FrontPage Editor - [Index]
File Edit View Go Insert Format Tools Table Frame Window Help
Corporate (Swiss) and U.S. libraries shared Intranet site.
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Welcome to the e-library for Geneva and USA
Journals
Databases & Alerts
Full holdings' list
E-journals by therapeutic category
Access to Medline,
other literature databases,
pharmacopoeias online,
regulatory and drug pipeline databases...
Document Delivery
Publication Channel
How to order a document
Reference Manager Web Poster
Journals list
Author guidelines and templates
Yellow Pages
Access to useful external web sites on a variety of categorised topics...
Normal HTML Preview
7 seconds

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E-Library : Intranet developments

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Serono Libraries -- Where next?

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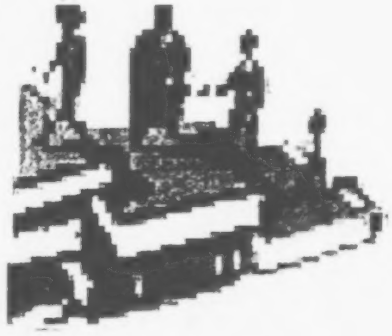

Serono's libraries are moving forward, and we are pleased with the building blocks we have put in place.

Our approach encourages shared solutions…

…but we recognize that one size does not fit all!

In a Do-it-Yourself World, Who Needs Librarians?

Scott J. Wilson
Los Angeles Times Editorial Library

My first glimpse into the world of online research came in 1983, when I was a fresh-out-of-college intern working in the public affairs department of a major corporation. In those technologically primitive days, the handful of computers in the department used ungainly 8-inch floppy disks – hard drives were unheard of – and the whole department shared one noisy dot matrix printer. People received and sent mail, not email, and read the newspaper on their desks, not online.

But in one room there was a hint of something bigger: a dedicated Lexis/Nexis terminal. This was not just a computer, this was a piece of furniture — it was big and wide and could be used only for searching Lexis and Nexis. It had brightly colored buttons with odd code words like "KWIC" and "Mail-It."

It was mysterious, fascinating and a little bit scary, especially when we were told that using it cost something like $180 an hour, a particularly frightening figure for an intern earning just $7 an hour. I didn't touch it, and for the most part it sat unused. But there was one woman there who was not intimidated. She used the machine with confidence and skill, seemingly pulling documents from it with ease. She had been trained as a librarian.

By 1987, I was in library school, online databases were proliferating, and the debate over end-user access to these resources was underway. A PC Week article that year reported, "In most corporations, and especially among Fortune 500 firms, on-line searching is performed almost exclusively by librarians. But this trend is gradually changing. Corporations are beginning to realize that certain professionals need direct access to information at a moment's notice."

Was the special librarian's role as an online searching intermediary endangered? No. Articles from that period identified four factors limiting the number of end-users doing their own searching: cost, search expertise, the technical requirements of searching, and time limitations. In other words, online searching was expensive, it often involved the use of arcane codes and abbreviations, it required a properly configured computer and modem, and it could be a big waste of time if you didn't know what you were doing.

I saw these principles in action at the San Francisco Chronicle library, where I worked after library school. There, the entire newsroom was welcome to use the newspaper's in-house electronic archive of stories. But most did not, instead calling on the library to search and retrieve. For the most part, the library users were thrilled with the speed with which we could retrieve articles from our own in-house database. An occasional article from Nexis, Datatimes, or Vu/Text was considered a terrific bonus.

Special librarians controlled the keys to the online research kingdom. In a 1989 article in Online, Donna Cornick dismissed fears that the librarian's role in online searching was doomed. "The intermediary will survive. Even in the face of the growing popularity of searching databases on compact disks or do-it-yourself online searching, the intermediary will continue to provide an important and necessary service."

Today

OK, enough with the trip down memory lane. Things have changed.

The Internet has given the world numerous easy-to-use and inexpensive research tools. Many library users are getting direct access to commercial databases such as Nexis and Dow Jones, which have redesigned their search interfaces to appeal to novice users. Online research is cheaper, easier, and less technically demanding than ever before. Even many venerable reference books have been supplanted by websites.

So, once again, we have to wonder: Who needs librarians?

Today I work at the Los Angeles Times Editorial Library. The Times library, like many special libraries, is undergoing a gradual shift in character to adapt to this new do-it-yourself world. The Times library employs 30 people, including 12 reference librarians, in Los Angeles, Orange County, Calif., and Washington D.C. The reference librarians serve the editors, writers and photographers of the Times, a potential user base of about 1,000 people.

Do-it-yourself online research is not a new concept for newsroom employees of the Times. Since 1992, staffers have been able to search TimesOnline, the papers' text archive, using a command line interface (a web browser interface was introduced in 2000). In 1997, the library rolled-out the web version of Mediasphere, an in-house database for photographs and other graphical images. Both TimesOnline and Mediasphere allow library users to get what they need without the assistance of librarians.

The Internet, meanwhile, has emerged as a viable and heavily used source of information for many reporters and editors. Times staffers have been connected to the Internet since 1994, when the library introduced a text-based intranet using the Lynx browser. Today, use of the Internet in the newsroom ranges widely – some tech-savvy people use sophisticated searches and download vast collections of data; others remain hesitant to attempt even the simplest function.

A significant change occurred in November 2001 when the Times library provided access to Dow Jones Interactive to all newsroom employees, allowing them to search the thousands of publications offered on that service. A total of 524 employees had signed up to use the service by March 2002. One month's statistics found 210 people actually using their accounts.

Rather than resent the shift in online research to the end-user, the Times library has embraced it as an opportunity to grow. The library's intranet – the home page for newsroom users – offers over 1,000 Internet links organized into subject categories, as well as fee-based

resources and customized databases developed by librarians. The library's CD-ROM server, accessible through the intranet, allows reporters and editors to remotely access Census information, public records, phone directories, and business records.

Resources available on the intranet include:

- Searchable databases of information gathered by Times reporters and librarians about the Sept. 11 terrorists, victims, and suspects, plus related chronologies and lists.
- Voter registration records of Los Angeles, Orange, Ventura, Santa Barbara, San Diego and San Bernardino counties.
- Campaign contributions for local, California and federal races, plus those from George W. Bush's 1994 and 1998 Texas gubernatorial campaigns.
- A special Census database that pulls together 2000 data, breaks down the complicated race and ethnic numbers into simple tables, and provides a unique focus on California. For instance, users can get demographics for the "six Southern California counties."
- The Los Angeles Times style and usage guide.
- O.J. Simpson criminal and civil case transcripts.
- Access to fee-based Internet resources such as Congressional Quarterly, Encyclopedia Britannica, FIS Online, Leadership Directories, and the Almanac of American Politics.

To help our staffers learn how to use these and other resources, the library offers classes and brown bag lunch sessions to anyone interested. Topics have included "Backgrounding an Individual," "Law and Legal resources on the Internet," and "The Literary Web: Quotes, Catalogs & Other Writing Sources." The sessions have proved popular, sometimes drawing an overflow crowd.

The More Things Change...

Now it's time for a reality check. Just because our library users have a well-stocked arsenal of online research tools at their disposal doesn't mean they don't need library help.

The fact is, despite all the advances, the number of end-users doing their own research is still limited by the same four issues faced 15 years ago: Time, money, technical capabilities, and searching skill.

Time: No matter how simple or easy online research becomes, there are some people who just don't have time for it.

At the Times library we receive countless calls for information that can be quickly found online: spellings, population figures, the party affiliation of politicians, the distance between two points, copies of stories from TimesOnline, dates of historic events.

In part, this is because some users are reluctant to spend time learning something that they doubt they'll need very often. But it also reflects a confidence that librarians can do the research faster and better.

Cost: Though online research is cheaper than ever before, it's not always free. Reporters searching the web often find links to articles, but can't view the stories without paying fees. They call the library to pull the article from Nexis, Dow Jones or Dialog.

In addition, since free Internet people-finding tools are fairly weak, many Times reporters call on the library to search for names in fee-based public records databases. Similarly, some online court records require a fee and are accessed only by librarians.

Technological limitations: For all the blessings that technology brings us, it seems to bring us an equal share of problems.

Who among us has an Internet connection that always works? Is there anyone whose browser has never frozen? Does your printer print perfectly every time? We all face technical problems, and Times staffers aren't immune.

Times reporters and editors call the library for help because they can't connect to a website, they can't get something to print out properly – or because they don't even have a printer. Sometimes Java doesn't work for them, or perhaps they need help opening a PDF or spreadsheet file.

Since the Times has reporters all over the world, some of them find themselves in situations with very limited resources. Reporters in Mazar-i-Sharif or Kandahar, Afghanistan, or even on the road in Missouri, often can't do their own online searching. If possible, we will fax or email what they need. Sometimes, there's no option but to read them information over the phone.

One unique feature offered by the Times library is the ability to print stories in "newspaper format." This is nicely formatted printout features the Los Angeles Times logo at the top, with the story presented in newspaper-like columns. It is very popular at contest time.

Search skills: We've put our end-users in position to help themselves.
But just because they can do some online research doesn't mean they can do *all* online research.

It's easy for librarians to forget that online research can be, well, *hard*. We've become so accustomed to the innumerable nuances of searching – the Boolean logic, field searching, relevancy rankings, truncation, automatic pluralization – that we may take for granted the skills involved.

In 1986, Emily Gallup Fayen wrote in American Libraries: "Although the goal of user self-sufficiency is laudable, the result is that patrons may think that using the library is supposed to be easy. This leads them to further devalue the services the librarian provides. Librarians may inadvertently reinforce this perception because the library and its workings become so second-nature to them after years of study and experience that they tend to forget what a complex organization a large library is. They have become so comfortable with the library's idiosyncrasies and procedures that they assume patrons can easily learn the system."

Fortunately, at the Times, our users seem to recognize their limitations. They turn to the library when a search is too complex, they're just not finding what they need, or they doubt the reliability of something they found on the Internet.

(Consider just one factor: the Tasini decision. This Supreme Court action has created such great holes in online archives that our end-users can't be sure of the thoroughness of their searches and must ask librarians for help. Said Tim Rozgonyi, assistant technology systems editor for the Pittsburgh Post-Gazette: "Tasini is the closest thing to a lifetime employment guarantee for news librarians that you will ever see.")

Perhaps most importantly, library users are seeking out librarians for help in navigating through the often-bewildering array of online research options now available. Times librarians are increasingly getting involved in the early stages of newsroom projects, assembling topic-related intranet pages, and serving as guides to the best and most authoritative online resources.

Conclusion

In the 19 years since I first saw that early Lexis/Nexis computer, online research has grown in ways that few could have imagined. What at one time seemed like a narrow specialty confined mostly to librarians has expanded to draw in a popular audience eager to find information without having to know arcane searching methods.

But rather than being displaced by this shift, librarians are finding themselves in important new roles. They are valued for their knowledge of constantly changing technology. They are needed for their ability to sift through a fast-growing information universe. And they are trusted for their skill in analyzing and assessing the quality of online sources.

So who needs librarians? Everyone.

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Keeping Knowledge Management Alive

Beth C. Perell
Wil[illegible]am M. Mercer

Knowledge Management (KM) is commonly defined as the process for enabling individuals within an organization to effectively share information and knowledge to save time and make better decisions. KM has become a strategic initiative in many organizations, yet during difficult economic times, special libraries, information centers, or KM are often targeted as cost savings opportunities. Unfortunately, eliminating this function within organizations more often than not has a negative effect.

When organizations lose people, they lose a considerable amount of institutional knowledge. Capturing this information becomes even more important during economic downturns; however, it also becomes more difficult. Just as the library may be affected by downsizing, the knowledge workers of organizations are also potential victims. As a result, individuals are not as willing to share what they know. They feel if their insight is shared, their personal value is decreased. These attitudes can further cripple an already fragile organization. Despite these challenges, there are methods for keeping KM a viable function within an organization, including ways to encourage knowledge sharing when individuals may not be as willing.

THE ROLE OF KNOWLEDGE MANAGEMENT

Knowledge Management (KM) has been around long enough for it to achieve the latest business fad status. TQM and BPR and many other business acronyms were once popular trends, but have since been replaced by new management styles. KM is still on the rise and appears to be a sustainable trend. A recent study by Gartner Group estimates that more than half of the Fortune 1000 companies will implement a KM system by 2003. IDC adds that the KM marketplace will exceed $12 billion by 2003.[1] These numbers are powerful enough for senior decision-makers to pay attention and foster a knowledge sharing culture within their organizations.

Knowledge Management has many definitions, but KM primarily deals with organizing and maintaining information and knowledge within an organization. Information professionals are best suited for these roles, and have been performing these tasks for decades. Some organizations have made this connection and rather than exploring what it might take to build up a knowledge management program, simply add managing organizational knowledge to the information professional's existing responsibilities. While KM is an excellent opportunity to elevate the library's position in the company and promote the staff's skills, it is often a daunting task.

KM REALITIES

Many companies have been affected by the recession, which has resulted in cost-cutting measures. While KM revolves around people, unfortunately people are often let go when the economy weakens. Often these measures are shortsighted and can cost the organization more money in the long-term. Each employee that leaves through layoffs or attrition takes their institutional knowledge with them. [2] Gartner estimates that worker productivity can increase by as much as 30% when companies invest in KM systems. Other benefits include increased market shares, learning from previous mistakes, and having the accumulated knowledge of the enterprise at hand.[3] Companies have touted that their true value is their human capital. However, when layoffs occur, employees begin to distrust their employers and protect their intellectual assets.

KNOWLEDGE CAPTURE TECHNIQUES

During tight economic times it is important to focus on KM to retain institutional knowledge and share it more efficiently throughout the organization. Allowing employees to hoard information or leave the company with their knowledge negatively impacts the company. These hoarders are detrimental to fostering a knowledge sharing culture. [4]

Traditionally, workers have been rewarded by what they know and how they apply that knowledge to excel in their jobs. Workers can use their knowledge to establish power and prestige within their organizations. These leaders can be seen as someone who is effective in sharing applicable information with the right people. Corporate culture rewards these individuals. Encouraging these leaders to share their information can be difficult, but necessary. One way to help ease the transition is to offer team-based rewards. When appropriate incentives are offered, employees are more inclined to work collaboratively. This environment enables more knowledge sharing.

KM is commonly interpreted as writing everything down and storing it in a database. Not all knowledge needs to be codified. To have a successful KM program, the organization should decide what knowledge is critical and determine who knows this information. There must be senior management support for KM initiatives to garner attention from employees. Once KM is seen as a strategic initiative, some employees will be more willing to comply. While KM may be thought of as important, other tasks from their jobs take priority. Hiring or assigning someone with the relevant skills to interview and capture their information can help busy employees. This journalistic approach requires adding resources but most often yields good results.[5]

Information professionals are certainly capable of taking on these journalism roles. Where information professionals can add considerable value is in accessing tacit knowledge – the knowledge inside people's heads that cannot easily be transcribed onto paper. In this "infomediary" role, information professionals can help foster a collaborative environment. Infomediaries can help users navigate KM systems and connect them to people who may have the answers they need. Users are often skeptical of information and need validation to trust the content and the author. Infomediaries are often successful at removing organizational barriers and can help in overcoming some of these challenges. [6]

Additionally, keeping statistics about the KM program and communicating metrics with senior management will improve chances for success. KM can be a difficult to quantify, but there are metrics to capture, like how many case studies have been developed or how many people are using the KM system. More importantly are the anecdotal stories. Telling the stories that are identifiable and have a memorable outcome are powerful tools that can prove the value of KM programs. For example, talking about how a company was able to land a $5 million contract because of the tools from the KM program has a strong impact on the organization that can be directly attributed to the bottom line.

DEALING WITH DOWNSIZING

Despite the best efforts of cost cutting, companies may still need to conduct layoffs. Should layoffs need to happen, there are several things to consider in how the downsizing is handled in relation to KM. The "core assets" or the most valuable knowledge brokers must be retained and protected. Naturally, these employees would not make the short list to be downsized. However, some of their colleagues, assistants, or mentors may be included in a lay-off. To keep these valued employees, they need to understand the reasoning behind the downsizing and be reassured of their value.[7]

Another suggestion to help with capturing relevant knowledge is to encourage laid off employees with extra severance to document their special processes, social connections, and general know-how. Granted, not everything a person knows can be written down and used effectively by another person, but the transition will be less painful. [8]

Keeping employees in a tough economic climate can be challenging. More money is not always the driving factor in retention. In a recent survey, most respondents cited exciting work, recognition, and supportive management as some of the reasons that employees stay in their current positions. In order for companies to sustain a competitive advantage, their top talent must continue to produce more efficiently. KM processes can further improve how these key employees work and achieve results.[9]

Libraries can get involved with improving employee efficiency and contributing to profits. They are well equipped with the skills for eliciting information and synthesizing it. Additionally, cataloging and organizing information are core skills that are necessary for KM programs to succeed. Using their infomediary skills, information professionals can facilitate the transfer of tacit knowledge. Unfortunately, libraries are often short on resources to take on more responsibilities. Finding ways to streamline current processes and partner with other internal departments will help information professionals take on some of these roles.

CONCLUSION

When companies are having financial difficulties, often the areas that are deemed core to the business survive. KM is often seen as benefit, but not as a strategic advantage. Organizations that prescribe to the tenets of KM have benefited from the results by keeping critical people and information in house and available to other employees. There is an investment that needs to be made to start and maintain KM programs. The results of implementing a

successful KM program can far outweigh these costs. Information professionals have the necessary skills to succeed in KM and when established correctly they will have senior management support. Continued communications of the successes of KM will help prove the programs value. Highlighting and improving these skills can help elevate the status of libraries, which may protect them during a repressed economy.

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Putting Knowledge to Work Effectively: Assessing Information Needs through Focus Groups

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Agricultural Information Center
University of Kentucky

To improve customer service, organizations require information about their users' needs and expectations. Focus groups can be easily implemented in any organization and allow clients to share knowledge about themselves which can be used to improve customer service. This paper describes how focus groups were used to assess the effectiveness of the University of Kentucky's Agricultural Information Center in providing patron services. It is hoped that the experiences described here will help other organizations gather data, assess performance and use the resulting information to improve customer service.

The University of Kentucky Agricultural Information Center (AIC) serves 1100 undergraduate students, 370 graduate and postdoctoral students, and 1700 faculty and staff in the College of Agriculture. In August 2000, the AIC conducted 9 focus groups consisting of 36 faculty, staff, graduate students and postdoctoral students. The feedback shared by these focus group participants was instrumental in redefining both the immediate goals and the Five-Year Strategic Plan of this service center. These immediate goals included creating an effective marketing plan, redesigning the library instruction seminars and improving other public services offered. The data gained from these focus groups gave the AIC a clear picture of how these goals can best be achieved. The focus groups provided more helpful information than any single evaluation tool used previously.

This paper will discuss the purpose of focus groups and describe the process of planning focus groups, implementing them, and analyzing the resulting data to improve customer service. To illustrate the process, the specific steps taken by the AIC will be described at each stage.

PURPOSE OF FOCUS GROUPS

Krueger and Casey succinctly state the purpose of focus groups:

> "Focus groups have been found useful prior to, during, and after programs, events or experiences. They have been helpful in assessing needs, generating information for constructing questionnaires, developing plans, recruiting new clientele, finding out how customers make decisions to use or not use a product or service,

testing new programs and ideas, improving existing programs, and evaluating outcomes." (Krueger and Casey 2000, 19)

All organizations should regularly assess the services and products they provide to help determine their future direction and identify areas requiring improvement. Focus groups are one of the many methods that can be used to collect the specific and detailed data necessary for this analysis. They can be effective tools for gathering information from both internal and external customers to assess specific services and overall performance of the organization. Unlike surveys, focus groups develop responses through synergy and group interactions. However, focus groups can be used to follow up on previous survey data or to identify topics for a large user survey.

FOCUS GROUPS AT THE AIC

The University of Kentucky Agricultural Information Center went through a dramatic transformation, beginning in 1998. The majority of the monograph and serial collections moved to the new William T. Young Library building on campus. The AIC retained control of collection development and other major collection decisions. The resulting space was re-engineered and staff effort redirected to meet the growing technological demands of the students, faculty, staff and Kentucky citizens. This included placing a greater emphasis on providing electronic access to as many products and services as possible.

In 2000, the AIC's Public Service Librarian realized that an assessment of services was needed to help determine the direction of the many public services offered, especially the library instruction seminars for faculty, staff, graduate students and postdoctoral students. At the same time, the University Libraries were updating their Five Year Strategic Plan. The AIC personnel quickly determined that an analysis of all services offered would generate useful feedback for the strategic plan. The AIC had data from the biennial User Satisfaction Surveys conducted by the University Libraries, but decided they needed more specific information. In addition, the survey included only library users. The AIC identified focus groups as a better method for reaching their non-library users and to receive detailed responses from participants.

PLANNING FOR FOCUS GROUPS

A significant amount of time was spent planning for the focus groups. This is in line with assessment research. In fact, Judy Sharken Simon recommends the following:

"Start planning at least four weeks ahead of the focus group session date. Six to eight weeks is probably more realistic. It takes time to identify your participants, develop and test the questions, locate a site, invite and follow up with participants, and gather materials for the sessions. You must have all the pieces in place if you are going to have a successful focus group." (Simon 1999, 40)

Goals

Setting clearly-defined, reasonable goals was a crucial step since this created the framework for all future actions. The AIC set several goals. The main goal was to discover whether the AIC adequately met the information needs of the faculty, staff, graduate students and postdoctoral students in the College of Agriculture. Additional goals included:

- To determine the direction needed for the library instruction programs offered to these patron groups.
- To learn more about the information-seeking behavior of this these patron groups.
- To see if the AIC's strategic plan is in line with patrons' needs.

After clarifying these goals, they were communicated to the College of Agriculture and University Libraries in order to gain their support.

Locations, Dates and Times

The AIC implemented its focus groups in accordance with the recommendations of Krueger and Casey:

> "Small focus groups, or mini-focus groups, with four to six participants are becoming increasingly popular because the smaller groups are easier to recruit and host, and they are more comfortable for participants.... Also, smaller groups are preferable when the participants have a great deal to share about the topic or have had intense or lengthy experiences with the topic of discussion." (Krueger and Casey 2000, 73-4)

The AIC decided to offer twelve possible sessions of four to six participants each within a two-week period. Although this was a demanding schedule for AIC staff, it was believed that the smaller groups would be more dynamic and generate more helpful data. Moreover, conducting all sessions within a short period of time ensured that the responses would be based on the same type of services and products. Sessions were scheduled for ninety minutes to allow time for introductions, discussion and summary statements. Two locations were used: both were familiar to most participants and provided ample parking. One location had teleconference capability for off-campus employees located in the two research stations.

Participants

The type of participants (College of Agriculture faculty, staff, graduate students and postdoctoral students) was determined by the project goals listed above, but many questions still remained. What criteria would be used to choose participants, how would they be recruited and how could attendance be maximized? Krueger and Casey stress the importance of homogeneity and variety of focus group participants:

> "The focus group is characterized by homogeneity but with sufficient variation among participants to allow for contrasting opinions. By homogeneity, we mean

> participants have something in common that you are interested in .... There are at least two reasons we are concerned about homogeneity. One is for analysis purposes. The other is for the participants' comfort—the degree to which sharing will be influenced by differences in participants' characteristics." (Krueger and Casey 2000, 71-2)

It was clear from the literature, that homogeneity and variety were both necessary ingredients to maximize effectiveness. To achieve homogeneity, the AIC selected two sets of focus groups based on patron categories: one for faculty and staff and the other for graduate students and postdoctoral students. To address the need for variety, the AIC drew from all departments across the College of Agriculture. These decisions were especially important for the data analysis phase that would happen later. Conclusions drawn from the participants' responses could predict the information-seeking behavior of most patrons in each of the above categories since participants were not limited to a particular department. In addition, since all participants in a particular session were from the same patron category, this was expected to increase the group interaction and thereby stimulate the discussion. A small group format was deemed best to allow more time for in-depth discussions.

The next step was recruitment. Since both library users and non-library users were desired, the AIC decided to request lists of potential participants from Department Chairpersons within the college. Each Chairperson was asked to submit names of three employees and three graduate or postdoctoral students including both library users and non-library users. The selection was not truly random, but on the other hand was not chosen by library staff. The Public Services Librarian contacted each potential participant. She explained the purpose and process of the focus groups and asked for date and time preferences. Fortunately, most participants were accommodated in one of their first two preferences. More potential participants were invited than needed to allow for possible declines. Of the twelve possible sessions, nine were chosen by three or more participants each, and three sessions were cancelled.

Questions

Simon aptly describes how focus group questions must be chosen to stimulate useful discussion and feedback:

> "The questions posed in a focus group are critical.... The sequence and tone of the questions are as significant as the questions themselves. To be effective, focus group questions should be open-ended, focused, and move from general to more specific.... a series [of questions] will move participants to a point where they feel comfortable discussing negative issues." (Simon 1999, 41-42)

The AIC based its questions (see Figure 1) on the goals set in the beginning. Six basic questions were asked in each session to allow plenty of time for responses and discussion among the groups. In addition, probing questions were sometimes used to generate more specific information as a follow-up question to a particular remark or to encourage more participation. The questions were open-ended and not leading to help eliminate possible bias due to expected

answers. The participants' comfort level was respected in the simplicity of the questions, the absence of library jargon and the avoidance of highly controversial issues. The same set of questions was given to all sessions to allow comparison of answers.

Figure 1 - Questions

1. What are your greatest information needs?
2. How do you usually find this information?
3. What types of information do you have trouble finding?
4. How has the AIC helped you?
5. Ideally, what services would satisfy your information needs?
6. What types of library instruction would be most helpful?

Moderator

The pivotal role of the focus group moderator is well-described by Hernon and Altman:

> "The moderator conducts the session, explains the purpose of the session, helps participants to feel at ease and willing to contribute, asks the questions, and maintains the constant flow of the conversation. A good moderator, however, blends into the background and lets the dialogue develop among the participants.... The moderator does not become defensive if customers criticize library policies or services." (Hernon and Altman 1998, 141-2)

The Public Services Librarian served as the Moderator for all sessions. She had the appropriate facilitation training background, she was new to the AIC and therefore did not know most of the potential participants, and there were no funds to hire a professional facilitator or moderator. Although this was not ideal, it did work well since she was familiar with the desired goals, library products and services, and the overall library system. Given the small number of participants in each session and the previous experience with meeting facilitation, the Moderator also agreed to record all comments on flipcharts and on audiocassettes. This provided assurance to the participants that their comments were heard correctly.

IMPLEMENTING FOCUS GROUPS

Hernon and Altman describe the importance of a friendly, informal setting which stimulates positive interaction:

> "The meeting area should be inviting, some refreshments provided, and participants given an opportunity to visit briefly and get acquainted, if they do not know one another. An informal setting may help the participants relax. Arranging the furniture so that participants face one another reinforces a positive, friendly atmosphere." (Hernon and Altman 1999, 141)

Environment

Signs were strategically placed in both locations to give directions to anyone who might need extra assistance. The primary location for the focus group sessions had one table in the middle of the room with eight chairs arranged for optimum communication. The space was appropriately sized and shaped to provide good acoustics and a comfortable environment. The second location had several tables and was a bit large, but was chosen for its teleconference capabilities. Participation was open to all employees located in the two research stations (in Princeton and Quicksand, Kentucky). Unfortunately, no one from either site chose to participate remotely via the teleconference equipment. However, at least one employee did drive in. In both locations, participants were able to choose where they preferred to sit and by whom. Blank nametags were provided and self-service light refreshments (coffee, soft drinks, water, cookies, doughnuts and candy) were available throughout each session.

Moderator

The Moderator plays an important role in keeping discussion on-track and insuring that all participants have an opportunity to express their views:

> "The facilitator [or moderator] should be able to deal tactfully with outspoken group members, keep the discussion on course, and make sure every participant is heard.... A facilitator must also head off arguments or public speeches about individual items and steer the group back on track." (Simon 1999, 42)

The Public Services Librarian, who served as Moderator and Recorder, welcomed all participants as they arrived. She encouraged each person to fill out a nametag with his or her preferred name for the session. It was important for participants to feel relaxed and comfortable so a few minutes of mingling was encouraged, as well as partaking in refreshments, before each session began. At the beginning of each session, the Moderator asked participants to introduce themselves, explained the purpose of the focus groups and how the data will be used, assured the participants of confidentiality and anonymity. The Moderator was aware of the importance of nonverbal communication, especially in these sessions. She made eye contact with everyone throughout each session. All participants were addressed equally using the names they had written on their nametags. The Moderator tried to foster the atmosphere of participant-led discussion as much as possible. Only when points needed to be clarified, particular persons needed to be encouraged to participate, or they needed to go on the next question did she retake control of the session.

Participants

Attendance was excellent. Of those invited to participate, seventeen out of twenty-five graduate and postdoctoral students attended, and all nineteen faculty and staff attended. This yielded over eighty percent participation from seven different departments within the college, not counting the remote sites that chose not to participate. Part of the success may be due to the

strong support of Department Chairs for the focus groups, but quite a few attendees expressed curiosity about what the library had to offer and wanting to learn more. Each session had its own character and specific topics that were covered, even though the same questions were asked each time. All attendees participated fully in the discussions, with very little encouraging necessary. This may have been due in part to the ground rules (see Figure 2) set at the beginning of each session.

Figure 2 – Ground Rules

1. All ideas are important
2. Everyone should participate
3. Audio taping by permission only
4. All sessions end within 90 minutes.

Data Collection

Data collection must be done carefully and with the full awareness of focus group participants:

> "Focus groups are typically recorded in two ways: by a tape recorder and with written notes. Written notes are essential .... [and] should be as complete as possible in case the tape recorder doesn't work.... Set up the tape-recording equipment and remote microphone before the meeting begins and in plain sight of participants." (Krueger and Casey 2000, 105)

The Moderator recorded all comments both in written form and by a tape recorder. The written comments were logged on a flipchart in plain view of everyone. Participants were encouraged to speak up if the Moderator logged their responses incorrectly. The Moderator asked permission before shortening or otherwise changing any wording from the actual comments. Typical facilitation techniques were employed including use of multiple appropriate ink colors, questions preprinted on each page and adequate space provided to encourage maximum feedback. The tape recorder was set up ahead of time, but the microphone was located in the middle of the table for everyone to see. Permission to use the tape recorder was requested after the introductions were made and the purpose was explained. All sessions were taped. These tape recordings were heard only by the Moderator and used for clarification purposes if a written response was not clear.

ANALYZING FOCUS GROUP DATA

It is important that focus group data be analyzed systematically, and preferably by someone who was present during the focus group discussion:

> "Focus group analysis is a deliberate, purposeful process. It is systematic, uses verifiable procedures, is done in a sequential manner, and is a continuing process." (Krueger and Casey 2000, 141)

> "We highly encourage that analysis be done by someone who was physically present in the room when the focus group was conducted. It's been estimated that 80% of the content is found in the transcript, and the remaining 20% are all the other things that occur in the room. In some groups, the environment must be sensed and felt." (Krueger and Casey 2000, 139)

After the focus group sessions concluded, the Moderator listened to each of the tape recordings and edited the flipchart notations as needed. All of the data was typed into a word processing document by a Student Assistant. All of the replies were grouped together by question. Different types of bullets were used to indicate which session each comment came from, and a "F/S" (Faculty/Staff) or "GS" (Graduate Student) was used to note the user group. After basic analysis of the data, six major topics emerged: collections, communication, electronic access, facilities, library instruction and library services. The data was transferred to a spreadsheet and rearranged into each of these major categories, retaining both the session and user group designations. Additional columns included the number of the question that elicited the response, what the AIC was already doing, recent improvements that have occurred since the focus groups were held, and the next steps needed to address the concerns raised.

The Moderator was able to determine that the AIC needed to promote more of its services and products already offered, continue moving in its current direction of enhancing electronic access to many of its products and patron services, and explore some new areas not yet offered. Most of the information was welcome news and fell in line with the strategic plan. Some of the suggestions for exploration had never been considered before, such as creating a software technology webpage that listed various types of software training available all over campus as well as links to tutorials and university licensing information.

In all, the data has been very informative and helpful in understanding the information needs of these user groups. The volume of data, however, was much more than expected due to the high response rates to the questions. The AIC personnel continue to work on addressing the issues raised and to incorporate the new ideas into the current strategic plan. In particular, marketing patron services and products has become a major priority, new seminars targeting information needs identified by both user groups will be offered this year and our website has undergone several enhancements to provide the types of information requested by the focus group participants (see Figure 3).

FUTURE PLANS

The AIC's focus group experience was so successful that the AIC plans to use this assessment tool on a regular basis. For very little cost, (less than $100 for refreshments and supplies), the library was able to gain a large amount of valuable information that has been quite helpful in evaluating the information needs of two large user groups and providing feedback on our current services and resources. Future plans may include electronic surveys, online focus groups and offsite focus groups for off-campus user groups. Information needs of other patron groups, such as undergraduate students and internal customers, also need to be assessed. A slight

increase in the number of participants per session would also be helpful. A longer recruitment period and follow-up reminders sent immediately prior to the sessions are possible ways to achieve this. Additionally, future focus group participants should receive a timely follow-up report in addition to the thank-you letter.

PUTTING KNOWLEDGE TO WORK

In conclusion, the resulting information from the focus groups has helped improve public service in many ways (see Figure 3).

Figure 3 – Resulting Actions

- Scheduled email message highlighting new and enhanced services and products with archive webpage of past messages
- Placed New Materials list on website and advertised via email
- Updated Reference Tools webpage
- Added more electronic journals, including more JSTOR titles
- Improved access to several databases, including dedupping in AGRICOLA
- Created Virtual Biology Library website
- Expanded webpage on proxy access instructions
- Enhanced training webpage including links to other training offered on campus
- Redesigned seminar series for faculty, staff, graduate students and doctoral students
- Initiated new In-Service workshops for cooperative extension personnel
- Offered circulation of Microsoft Office software licensed by the university
- Added more direct links to articles from databases
- Expanded journals holdings information in library catalog
- Presented information to Department Chairs about library services and resources
- Designed a new training room available for university groups
- Provided links to database tip sheets on website
- Improved copy card service

The focus groups provided a wealth of detailed ideas for the AIC to explore. They are an excellent example of using the knowledge that patrons have to assess and improve the services and resources offered by an organization, and have enabled the AIC to respond directly to user needs and desires.

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Putting Knowledge to Work Effectively: Assessing Information Needs Through Focus Groups

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Purpose of Focus Groups

- Assess patron services
- Obtain detailed information
- Facilitate group discussion
- Reach non-library users
- Supplement patron surveys

University of Kentucky
Agricultural Information Center (AIC)

- Serves the UK College of Agriculture
  - 1100 undergraduate students
  - 370 graduate & postdoctoral students
  - 1700 faculty & staff
- Staffed by
  - 2 FTE Librarians & 4 FTE Paraprofessionals
  - 2.5 FTE graduate & undergraduate students
- Emphasizes electronic resources and services

Focus Groups at the AIC

- Determine direction of public services
- Update Five-Year Strategic Plan
- Develop immediate goals for AIC
- Discover unmet patron needs
- Follow-up on biennial User Satisfaction Survey data

Planning Phase

- Establish appropriate timeline
- Set clearly-defined goals
- Select locations, dates and times
- Determine desired participants
- Develop a series of questions
- Hire an experienced moderator

Implementation Phase

- Create a relaxed environment
- Encourage participant-led discussion
- Set ground rules
- Maximize participation
- Collect data

Analysis Phase

- Review all data
- Determine major themes
- Present data effectively
- Categorize actions needed
- Prioritize goals for AIC
- Report results

Future Plans

- Ongoing assessment
- Electronic surveys
- Off-site or online
- Other patron groups

Utilize the information available to you

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Raising the Bar or Training Library Technicians to Assume Reference Responsibilities

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The National Institutes of Health (NIH) Library instituted a program to train library technicians to work at the Information Desk as Reference Assistants. The objectives of the program were to train library technicians to become reference assistants, to free up librarian's time for new work assignments, and to increase the job satisfaction of library technicians.

Prior to the training program, the Information Desk was staffed Monday through Friday from 8:30 a.m. to 5:00 p.m. by one librarian or, during the busiest times, by two librarians. The librarians were all members of the Information Services Team, who met monthly to coordinate the service, and were responsible for staffing the esk, performing mediated database searches, and responding to questions about accessing and using the Library's electronic resources. These services required about 90 hours a week of the librarian's time.

A number of factors, such as changes in document delivery procedures, had a direct effect on staffing needs in the Library. As users of the NIH Library increasingly were able to submit document requests electronically, as a result of a search of databases such as PubMed and Web of Science, the requests contained citations that did not need correcting. The highly skilled library technicians who had performed this work had less and less work to do. At the same time librarians, who had traditionally staffed the Information Desk, were increasingly asked to do new work including developing web pages, evaluating and negotiating licenses for electronic resources, and knowledge management projects. It was difficult for the librarians to find the time to perform both the traditional work and the new work. In addition, fewer reference questions and fewer mediated search requests were being received at the Information Desk. Finally, a survey of the types of questions received at the Desk revealed that approximately 60% were of the ready reference type question that could easily be answered by well-trained paraprofessionals.

As a result of these changes, it was decided to build upon the special skills of the library technicians in searching databases and verifying references and train them to use a broader array of print and electronic resources so that they could work at the Information Desk as Reference Assistants. The Assistants would be expected to respond to questions about the Library's collections and services; search the online catalog and respond to questions about the Library's holdings; verify citations using specific tools; perform cited reference searches; assist customers using the computers located in the Library; respond to ready reference questions using Library resources such as the reference collection, the

Internet and the Library's electronic resources; and guide and explain to customers the resources available on the Library's web site.

This change in staffing would ensure that the library technician's skills will be put to good use and about 30 hours a week of the librarian's time would be freed for new work. In addition, the library technician's jobs would become more varied, they would be able to develop new skills, and their jobs would, therefore, be more interesting.

BACKGROUND

A review of the library literature concerning training paraprofessionals for work at the information desk revealed a number of articles with good advice about setting up such a program. The following points were very useful to us as we developed our own training plan:

- Design and implementation of an effective training program considers details such as class time, supplementary materials, teaching and learning styles, and evaluation methods (1).
- Both knowledge based skills, which cover such things as the use of common library reference tools, and communication skills, which reinforce the appropriate positive attitudes such as body language, active listening, interview techniques and the ability to handle difficult questions need to be considered (8).
- One should provide a clear definition of the tasks that reference assistants will perform and the resources or services that they will be providing to the customers (8).
- One should provide accurate written documentation of the library's policies and procedures (8).
- Training should be customized to the needs of the individual library, the specific questions that are likely to come, and the readily available information sources that will serve to answer them (3, 6).
- Training should be customized for the trainee though the use of a training needs survey (3).
- Training can be provided by the use of both outside and in-house trainers including paraprofessional staff (9).
- Close proximity between reference assistants and professional librarians will provide hands-on-training and help to ensure quality service at the desk (5, 7).

RECRUITMENT AND TRAINING

Recruitment began in the summer of 2000 when a vacancy announcement describing the position and the skills needed for the job was posted on the Library's Intranet inviting all library technicians to apply for the Reference Assistant Training Program. Each candidate, if chosen, was expected to serve approximately 8 hours a week as a member of the Information Services Team with, eventually, five of the eight hours devoted to working at the Information Desk. By the closing date of the announcement, five library technicians, four from the Document Delivery Unit and one from the

Circulation Unit, had submitted applications for the program. The applications consisted of the following documents:

a. A statement of their interest in and qualifications for the position
b. A signed consent form from their supervisor verifying that they had the time to participate in the program
c. A response to the three skills needed for the position that they considered to be most relevant to the position.

All applications were submitted to and reviewed by a team composed of members of the Information Services Team. All five applicants were subsequently interviewed and accepted into the program. Each trainee was assigned a mentor, a professional reference librarian, who would work with them throughout the program.

OUTLINE OF PROGRAM

Before the training program started a training plan was developed that outlined the training activities made available to the reference assistants. We were aware that people have different learning styles and, therefore, to ensure a successful program we incorporated several types of learning activities including readings, lecture and discussion, practice reference questions, coursework, observation, independent study, working at the Information Desk, and mentoring.

The training plan consisted of nine Developmental Objectives (see Figure 1) with each objective having one or more Developmental Activities (see example in Figure 2) to help achieve the objective.

Figure 1: Developmental Objectives
1. Learn the organizational structure and research programs of NIH
2. Learn the policies and procedures of the NIH Library
3. Assist customers to locate Library materials.
4. Enhance the communication skills necessary to conduct a reference interview.
5. Provide accurately and timely answers to basic or ready reference questions with source identification.
6. Become familiar with electronic resources available on the Library's reading room computers.
7. Become familiar with the structure, function, and principles of frequently used electronic resources.
8. Become familiar with web browsers, web search engines, and useful biomedical and reference sites sufficient to perform topical and citation verification searches.
9. Become familiar with the principles and practices of online search strategy sufficient to perform topical, cited reference, citation verification, and cited reference searches.
10. Keep abreast of current and emerging information technology in the NIH Library.

Each Developmental Activity contains one or more resources. These resources consist of activities, classes (developed in house or given by vendors), self-directed learning, suggested readings, exercises, and formal training classes. Each resource was

designated as either mandatory or optional, was assigned a difficulty level, and was given an estimated time in which it could be completed.

Figure 2: Examples of the Developmental Activities and Resources

5.1 Developmental Activity: Become familiar with heavily used printed reference tools.

Resources:

5.1.1. Shelve books in the reference collection for two months. (Optional)
Time Commitment: 2.5 hours/week
Level of Difficulty: Basic
Instructor: Self Study

5.1.2. Attend review of highly used reference tools and answer practice questions. (Mandatory)
Time Commitment: 2 hours
Level of Difficulty: Basic
Instructor: Reference Staff

5.1.3. Locate answers to practice reference questions. Review with mentor. (Mandatory)
Time Commitment: 10 hours
Level of Difficulty: Intermediate
Instructor: Self-study and mentor

7.1 Developmental Activity: Become familiar with coverage and ways to access the Library's electronic resources.

Resources:

7.1.1. Attend overview of the Library's Web page including the electronic resources (Mandatory)
Time Commitment: 1 hour
Level of Difficulty: Basic
Instructor: Instruction Team

7.1.2. Attend in-house tutorial on searching Ovid (Mandatory)
Time Commitment: 1 hour
Level of Difficulty: Intermediate
Instructor: Instruction Team

7.1.3. Attend Seminars on searching Web of Science and PubMed (Mandatory)
Time Commitment: 2 hours
Level of Difficulty: Intermediate
Instructor: Instruction Team

7.1.4. Read handouts prepared by NIH Library staff members on using Web of Science, PubMed and Ovid. (Mandatory)
Time Commitment: 3 hours
Level of Difficulty: Advanced
Instructor: Self Study

It was estimated that the total time period needed to complete the Training Plan was six months. However, prior to the start of formal training, each reference assistant was given an assessment tool, designed to test his or her knowledge of some of the training plan objectives. The completed Assessment Tool was given to their mentor to score and the results were discussed the assistants. If the answers to one or more of the objectives showed that they were knowledgeable in that area, then they did not have to complete the related resources, e.g., document delivery technicians were knowledgeable in the areas of document delivery policies and procedures and some were also knowledgeable in using PubMed to verify and/or complete citations.

In addition to completing the objectives outlined on the Training Plan, each Reference Assistant began serving on the Information Desk, one hour a week with their mentor. The first month was spent mainly observing and learning the routine. During the second month they began answering questions, always under the guidance of their mentor, and during the third month they began serving two hours a week on the Information Desk. At the end of the six-month period, each Reference Assistant was serving five hours per week on the Information Desk without their mentor. However, another member of the reference staff was always assigned to the Desk and acted as their backup, should they need it.

ASSESSMENT

At the end of the training program, we assessed the Assistant's ability to perform reference work by asking their mentor to provide a written evaluation, requiring that the Assistants pass a written test, and observing them at the Information Desk. The mentor's written assessment was based on whether the Assistant had achieved the required developmental objectives. The mentor rated the Assistant's ability in each objective using a five-point scale and was asked to give their opinion about whether the Assistant had successfully completed the program. The written exam contained fifty multiple choice or true-false questions that primarily concerned the resources available in the Library and Library policies and procedures. Finally, the Assistants were observed during two different periods of working at the Information Desk and were rated on their ability to interact with customers using the "Model Reference Behaviors Checklist" found in the article by Gers and Seward (4).

LESSONS LEARNED

During the course of the training program, several issues needed to be addressed. The Assistant's were given eight hours a week to complete the training program; however, they found it difficult to fit in their regular duties along with the program. The Assistants had to learn to apply time management principles to ensure that the objectives of the program were achieved as well as the completion of their usual duties. This issue indirectly led to a change that was made in the program as it progressed. The training plan had originally called for the Assistants to spend a significant amount of time in self-paced study such as reading articles, working their way through *The Language of Medicine: A Write in Text Explaining Medical Terms* (2), perusing the more heavily used

reference books, or exploring some of the electronic resources available to customers. This self-paced study proved difficult to fit in to an already hectic schedule and we, therefore, modified the program to include more formal courses that were taught by Library staff. Courses that were added included classes on the most heavily used reference books, trouble shooting problems with the computers provided in the Library, cited reference searching, and introductions to many of the Library's electronic resources.

An added bonus to the program is that the librarians who worked with Assistants found that they learned a lot from the Assistants about the Assistant's areas of expertise, circulation and document delivery, and were, therefore, better able to explain the Library's policies and procedures in these areas to the customers.

To assure the continued success of the Reference Assistant Program, we are currently developing a 'continuing education' and on-going evaluation program for the Assistants.

CONCLUSION

The successful implementation of this education program resulted in the training of four library technicians to respond to ready reference questions at the Information Desk and provided more time for librarians to pursue new areas of responsibility.

The increase in job satisfaction by the library technicians is illustrated by this quote from one of the Assistants, "I love being a reference assistant. I find the work both stimulating and educational. I know that the experience I am gaining at the information desk will be invaluable to me in whatever future career path I take. I also enjoy the closer professional relationships I have developed with the librarians."

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Analysis and Visualization: Hit or Hype?

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Are tools for analysis and visualization a cure for the plague of information overload? If so, why aren't they widely available and widely used? Search and retrieval tools have become very good at finding mountains of information, but tools to deal with the mountain lag behind. The promise of analysis and visualization tools is to aid in navigating, categorizing, summarizing, and finding patterns in the data. Such tools promise us to more quickly extract knowledge and gain insights. What are the challenges we face in turning this promise into reality?

As a producer of and online host to the world's largest databases of chemical, scientific, and technical information, CAS is working to provide tools to help people manage the problem of too much information.

OVERVIEW

Information is everywhere. Information is essential. Information is empowering. And yet, information is elusive. More than ever, we need tools to find and make sense of information around us. Over the past 5-10 years we have seen dramatic improvements in information accessibility, speed, usability, and fact-finding. Expectations have been raised concerning what is possible. However, advancements in the ability to synthesize knowledge from data have not kept pace with the ability to amass information. How have tools for analyzing and visualizing data helped? Content, technology and integration, business and economic, and people issues challenge us in increasing the use of these tools.

SOLVING ONE PROBLEM LEADS TO ANOTHER

It can be said that one long-standing dream has now been satisfied. Technology advances have made fact or data look-up fast, efficient, and relatively inexpensive. The World Wide Web serves as the great integrator of advances in user interface design, data storage, database, server, and networking technology. The proliferation of Web search engines makes it easy for anyone to locate information. Type in a couple of words and the search engine instantly returns hundreds if not thousands of Web pages for perusal. This wonderful capability leads directly to the worsening problem of *too much* information. The ease with which new information is generated, retrieved, and delivered exists for public and private data, unmediated and mediated data. Figures

1 and 2 show the increase in the number of unique Web sites [1], and in the number of abstracts appearing in Chemical Abstracts – over three quarters of a million new abstracts in 2001 alone. [2]

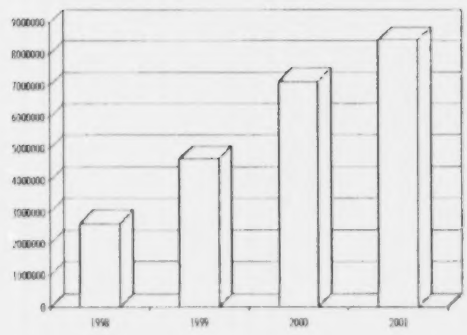

Figure 1 – Unique Web sites per year
Source: OCLC Web Characterization Project

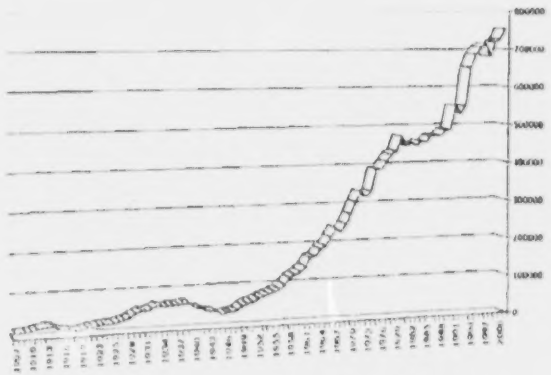

Figure 2 – Abstracts published in CA per year
Source: CAS Statistical Summary 1907-2001

Effective problem solving and decision-making depends on more than the bits of information that are easily found. Information must be gathered, vetted, analyzed, and studied before knowledge, wisdom, and insight are possible. Synthesizing higher order value from raw data takes hard work and time. There is not enough time to read, sort, categorize, analyze, and absorb this much data. New capabilities are needed.

ANALYSIS AND VISUALIZATION TOOLS TO THE RESCUE

Increasingly, tools for analysis and visualization are seen as the solution to this problem. Analysis tools assist in organizing the data, separating it into parts, and studying the interrelationships. Visualization tools present information in ways that reveal the structure, relationships, connections, patterns, and trends in the data. A visualization that is interactive enables rapid navigation through the data, along paths where connections have been made. As the problem of too much information began to emerge, so have new tools for analyzing and visualizing. One way to classify these tools is to consider the types of information they are designed to manage.

Tools tend to be targeted for specific types of data. Examples of data types include structured and unstructured text, numbers, two and three-dimensional chemical substances, hierarchical and network information. Some tools straddle the boundaries of more than one type of data. The table in Figure 3 shows six data types and ways in which corresponding tools enable new value to be extracted. This is not an exhaustive list and new tools and features are routinely announced.

Structured Text: *Organize data, analyze relationships*
- BizInt Smart Charts [3]
- SciFinder Panorama [4]
- STN ANALYZE command [5]
- STN Express with *Discover!* Table Tool [6]
- VantagePoint [7]

Unstructured Text: *Identify and cluster concepts, reveal relationships*
- Aurigin Cartia [13]
- ClearForest ClearResearch [14]
- FAST [15]
- Northern Light [16]
- OmniViz Pro [17]
- Vivisimo [18]

Numbers: *Analyze and reveal relationships, clusters, trends*
- LeadScope [8]
- MS Excel [9]
- Spotfire [10]

Hierarchical: *Reveal relationships, navigate information space*
- Accelrys Diva
- Antarcti.ca Visual.Net [19]
- Inxight Star Tree [20]
- LeadScope
- SmartMoney.com Map of the Market [21]

Structures, 2D: *Visualize chemical models*
- Accelrys Diva [11]
- STN
- STN Easy [12]

Structures, 3D: *Visualize chemical and biological models in three dimensions*
- Accelrys WebLab Viewer [22]
- AutoDOCK [23]
- STN Easy

Figure 3 – Data Types and Related Analysis and Visualization Tools

Among these tools are some of the best available and yet, not all are widely used. Are there tools here you use on a regular basis? Do you rely on analysis and visualization tools to cope with information overload? If not, why not? If there is indeed demand for these capabilities, what will it take for these tools to fulfill that need and achieve widespread use? To find the answers to these questions, we need to look beyond the pretty pictures that first attract our attention.

MANY FACTORS TO SUCCESS

Analysis and visualization features and functions vary greatly, but so do several other key factors not immediately considered. The future success of analysis and visualization tools lies in vendors' ability to meet customer's needs in achieving the proper balance of content, technology and integration, business and economic issues. Not to be overlooked are the human factors. In fact, there is no single issue that guarantees success but there are many issues that can hinder it. The relative importance of each issue will vary according to the needs of the individual organization's situation. Let's examine the issues in more detail.

1. Content

The source of the information to be analyzed and visualized is at the center of the problem and critical to any solution. If the source of data is private, then it may be presumed that the data will be hosted in-house. The data needs to be accessible to and in a format expected by the tool. To enable this may require a certain level of computer system and network expertise. If the information is from a public source, it should be as comprehensive, consistent, and of high quality as possible. In order to demonstrate their capabilities, many vendors apply their tools to publicly available information, but also support in-house implementations for private data.

Public Sources:

- Web pages gleaned from public Internet sites
- Government-produced files such as Medline and the U.S. Patent and Trademark Office database,
- The Open Directory Project Web index
- Stock market data

Vendor Databases:

- Chemical Abstracts Service databases such as CAplus, REGISTRY, and CASREACT
- Value-added patent databases from Derwent
- Business, industry, and news databases

In the operation of its services, CAS supplies information for its tools in the form of databases it builds from publicly disclosed journal and patent sources.

2. Technology and Integration

Hardware and software architectures affect the speed and scalability of analysis and visualization. When response time needs and data set sizes exceed desktop capacities, analysis may need to be handled remotely in a multi-tiered architecture. This in turn may require a substantial investment in computer hardware and networking. Data may have to be accessed, parsed, cleaned, and reformatted before it can be analyzed. The visualization is typically delivered to the individual's desktop. More complicated solutions may be needed when data is from multiple sources, especially if those sources are a combination of internal and external data.

In the information environment, it is essential that the analysis and visualization tools be integrated with the search and retrieval tools. It should be seamless to invoke the necessary tools for the job. Any extra hoops that must be jumped through are barriers to success. With SciFinder, CAS has made a variety of tools available to seamlessly analyze and visualize search results. At times, the integration extends to third-party tools such as Microsoft Excel, Aurigin Aureka, and Spotfire DecisionSite.

3. Business and Economics

The cost to enable analysis and visualization can be daunting. In this emerging area, advanced software tends to be expensive. Besides the added hardware, networking and systems development costs already mentioned, the cost of data acquisition must be considered. CAS has innovated new solutions to help its customers deal with data acquisition costs. The STN ANALYZE command utilizes a tiered pricing structure which caps the data expense after the first 10,000 database records. With SciFinder task and subscription pricing, analysis of search results is supported at no additional cost.

Finally, the ongoing support and maintenance costs should not be overlooked. Because the benefits are sometimes difficult to quantify, the return on investment may be difficult to calculate.

Because this is an emerging field, there are few established players. An important business consideration may be in the vendor's ability to provide systems integration, training and support. In the aftermath of the dot-com collapse, there is added awareness of the stability and long-term economic viability of software vendors.

4. The Human Factor

An important factor in fostering the use of analysis and visualization tools is training. The sooner those who need the tools can make effective use of them, the sooner a return on the investment can begin. Power tools that are complicated or difficult-to-understand are usually in the realm of a small group of information specialists. However, when tools are needed by a larger audience, those that are easy to use have lower training costs and will gain quicker acceptance. In considering this, the software interface should be easy to use and the resulting analysis or visualization should be easy to interpret. Without a doubt, STN is an information specialist's tool, but frequent training seminars, newsletters, and the best Help Desk in the business help customers stay up to date with the necessary skills. SciFinder is well known for its ability to be used with little or no training

SUMMARY

As problems in information retrieval have been increasingly solved over the past several years, the complications of information overload have come to the forefront. Many innovative and powerful solutions have emerged in the form of tools for analysis and visualization of information. The future success of these tools is dependent on much more than their exciting and effective ways of presenting information. A proper balance of content, technology and integration, business and economic issues is needed.

Endnotes:

[1] http://wcp.oclc.org/

[2] http://www.cas.org/EO/casstats.pdf
[3] http://www.bizcharts.com/
[4] http://www.cas.org/SCIFINDER/panorama.html
[5] http://www.cas.org/ONLINE/STN/STNOTES/stnote17.html
[6] http://www.cas.org/ONLINE/STN/discover.html
[7] http://www.thevantagepoint.com
[8] http://www.leadscope.com
[9] http://www.microsoft.com/office/excel/default.asp
[10] http://www.spotfire.com
[11] http://www.accelrys.com/products/diva/index.html
[12] http://www.cas.org/stn.html
[13] http://www.aurigin.com
[14] http://www.clearforest.com
[15] http://www.alltheweb.com
[16] http://www.northernlight.com
[17] http://www.omniviz.com
[18] http://vivisimo.com/
[19] http://antarcti.ca
[20] http://www.inxight.com/
[21] http://www.smartmoney.com/marketmap/
[22] http://www.accelrys.com/viewer/index.html
[23] http://www.scripps.edu/pub/olson-web/doc/autodock/

Characteristics of Information Agencies (libraries) and Information Agents (librarians) in Highly Productive Computer Software and Services Companies: The Key to Growth and Survival?

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INTRODUCTION

The relationship between productivity and the existence of a library or information center and/or librarian or other information agents has been the topic of prior research across disciplines as diverse as economics, social sciences, engineering, as well as library and information science. Most of the research by library and information scientists on this topic was conducted between 1975 and 1995. A substantial portion of that research focuses on calculating the value of information and information services. Other studies approach the issue by exploring the impact of information services and information professionals on creativity and innovation, scientifically proven contributing factors to productivity.

In 1979 two things happened to change the focus of research. First, growth in United States (US) productivity, measured as US gross domestic production per employed person, hit an all-time low. Second, it became evident that traditional workforce productivity measures, formulated during the industrial age, fail in the information age. Today's workforce, largely a new class of professionals known as *knowledge workers*, spends a large amount of its time creating, using and communicating knowledge. Currently knowledge workers spend an average of 9.25 hours per week gathering and analyzing data (Strouse, 2001). Identifying techniques for improving productivity of knowledge workers becomes increasingly important since improving knowledge worker productivity should improve an organization's productivity. Subsequent development of econometric calculations dealing with the overall effect of information as a factor in industrial productivity yield consistent results from a variety of research studies (Koenig, 2000).

There are a number of ways in which productivity can be defined because of the many potential variables. Revenue per employee is a commonly used metric in the business sector, particularly the software/technology industry to measure profits, operational efficiency, growth and productivity (Hadley, 2002). It is one of the most important benchmarks used by companies to compare their performance to competitor and peers because companies with high revenue per employee ratios demonstrate a tendency to better utilize their workforce (Software Success, 2002). Revenue per employee is defined as the amount of total revenues from all sources

divided by the average number of employees both full and full-time equivalent. Average number of employees is defined as all employees during the revenue period ("From the Middleton," 1997).

This study uses the following formula published by the Bureau of Labor Statistics (referred to in Bearman, Guynup & Milevski, 1985) to develop a "revenue per employee" number to serve as the criteria for productivity measure.

$$\text{Productivity (Revenue/employee)} = \frac{\text{Output (software/service revenue)}}{\text{Input (employees)}}$$

Where:

Output = Calendar year 2000 total worldwide software and service revenue
Source: Software Magazine 2001 Software 500 Methodology

Input = Calendar 2000 (year end) employees
Source: Software Magazine 2001 Software 500 Methodology

Information environment characteristics fostering productivity gradually emerge as research turns to user studies that focus on information seeking habits and information usage by workers. Studies by Koenig (1990) and Griffiths and King (1993) show that highly productive companies share information freely across the enterprise and their workers seek information from diverse external and internal sources. Researchers from a variety of disciplines, particularly those investigating creativity and innovation, report substantially the same results. Findings on the characteristics of productive information workers are consistent with and complementary to these information environment findings.

Unfortunately, there remains no consensus as to which services provided by libraries or information centers and librarians at highly productive companies make the greatest contribution. Lastly, there is no research into the impact of either internets or intranets on a library or librarian's contribution to productivity. Since it is known that libraries and librarians contribute to organizational productivity, then understanding characteristics of information agencies (libraries) and information agents (librarians) of highly productive companies should enable creation of an information environment that would support productivity improvements. Improved productivity will ensure viability of both the sponsoring organization and its library and librarians.

This study will seek to answer the question, "Will an analysis of characteristics of libraries or information centers and librarians in highly productive companies yield operational models and standards that can improve their efficiency and effectiveness and their parent organization's productivity?" If so, then models for optimum staffing, staff profiles, operational efficiencies, information products and tools, and information services best practices for software and services libraries and librarians can be developed in tandem with appropriate metrics and measurement techniques.

REVIEW OF SELECTED LITERATURE

A number of studies examined the value and contribution of library and information centers, information professionals, and information content to company performance, health and success. Highly productive companies require a steady stream of actionable information to sustain a competitive advantage (Davidow & Malone, 1999). The more competitive the market place, the greater the information need, and the greater the investment in information services though there is evidence that companies consistently underinvest in information resources (Koenig, 1999).

Companies do differ in their ability to produce productivity gains from information resource investment. Industries considered information intensive such as financial services are more likely to improve their productivity than non-information intensive ones such as manufacturing (Harris & Katz, 1991). Internal and external factors affect a company's productivity gains. Internal factors may be top management's commitment, a company's prior experience and satisfaction with information investments, and company politics. External factors can include marketplace, a company's financial standing prior to the investment, and the company's size and ability to benefit from economies of scale (Olson & Weill, 1989).

Literature on the relation of libraries, library services and productivity is scattered among various disciplines. In the information and library science field, the earliest research focuses on the value of information. It either describes the concept of value and ways to measure it or describes the calculation of the value of information products and service using those measurements (Griffiths, 1982). The definition of productivity and its measurement are also considered because of the close relationship to measures for valuing information.

Value assessment from the user perspective was advanced by the work of King et al during a study on the value of the Energy Database (as referred to in Griffiths, 1982). Three views of user perspective valuation were defined: 1) *input perspective* or what users would pay for information and its products or services; 2) *process perspective* or how the use of information affects works; 3) *output perspective* or how work affects the environment as a whole.

Graham and Weil's 1975 Exxon Research Center study is considered the seminal work on valuing information services (Koenig, 2000). This study evaluated the benefit of the service provided *and* derived a value of information something that had never been done before. 62% of Exxon researchers reported that information events recorded over twenty randomly selected days were of benefit and 2% of the participants quantified that value. Graham and Weil were able to extrapolate an 11:1 ratio of benefits to cost of providing the information services. This study was followed by a similar but larger study at NASA in the late 1970s.

Both of these studies developed a cost/benefit ratio comparing the benefits likely to be saved or cost savings to product costs. Valuation methodologies of this type were most fully developed and widely applied by King Research in the late 1970s and 1980s. A comprehensive review of this research is available in Griffiths and King, (1993) Special Libraries: Increasing the Information Edge. The business and management literature also contains reviews of research

conducted on the relationship between information and productivity, but with a focus on the impact of information on innovation and research (Buderi, 1999).

Two factors led to a change in direction of research examining the relationship between information services and productivity in the late seventies. First, the growth rate of United States (US) domestic production per employed person hit an all-time low. Bearman et al. (1985) cite contributing factors for the decline such as aging industrial plants, a decline in research and development spending, growth of the service sector, the end of the shift from agriculture, an influx of inexperienced people into the workforce, and management attention to return on equity rather to productivity. Second, it became evident that traditional workforce productivity measures, formulated during the industrial age, and based on traditional production processes and techniques, failed in the information age.

The workforce is now comprised largely of a new class of professionals known as *knowledge workers*, a term first coined by Peter Drucker in 1959 (Drucker, 1994). Since knowledge workers spend a large amount of their time, 9.25 hours a week (Strouse, 2001) creating, using and communicating knowledge, improving knowledge workers' productivity should improve an organization's productivity.

Productivity is defined as "a concept that expresses the relationship between the quantity of goods and services produced—output, and the quantity of labor, capital, land, energy, and other resources that produced it--input" (Bearman et al. 1985, p. 371). Griffiths & King (1993), when referring to increased productivity, state, "this involves increasing profits" (p.28). Many variables affect productivity, such as economic performance, marketing and advertising, the customer base, and the number or diversity of business segments in a company. These factors and their effect will vary by company or industry. In this study the productivity measure of revenue per employee will be used to define highly productive companies.

Research and development (R&D) units have most often been the subject of studies examining information environments in productive corporations. Orphen's 1985 study (referred to in Koenig, 2000) reveals that productive organizations are populated with managers displaying the following behaviors:

- Literature and references were routed to scientific and technical staff
- Staff was directed to use scientific and technical information (STI) and to purchase STI services.
- Professional publication, networking, and continuing education of staff were encouraged

Koenig (1990, 2000) developed, as part of a study, a generalized list of characteristics of the more highly productive pharmaceutical companies. They are:

- Greater openness to outside information - Researchers attended more external meetings at which information was *exchanged,* they were encouraged to not only keep current in their field, but to see information beyond their current assignment, and professional activities were supported.

- Less concern with protecting proprietary information – Publication after a patent had been granted and published was encouraged, and the company was perceived as typical rather than well above average in concern for protecting proprietary information
- Greater information systems development effort - More time was spent developing more sophisticated information systems by library or information center staff.
- Greater end-user use of information systems and more encouragement of browsing and serendipity – The corporate research culture encourages researchers to spend time in the library or information center and to browse sources themselves.
- Greater technical and subject sophistication of the information services staff – Staff conducts the more complex technical and subject research while the researchers do the routine literature searches.
- Relative unobtrusiveness of managerial structure and status indicators in the Research & Development environment – There is an egalitarian culture.

Researchers from a variety of disciplines investigating creativity and innovation report substantially the same findings. Studies show that information access, contact with external information sources, and diversity of information sources are key factors to successful innovation. Utterback's (referred to by Koenig, 2000) review of management literature cites consistent communication as the primary contributing factor to innovation. Wolek and Griffith's (referred to by Koenig, 2000) review of sociology literature reaches the same conclusion. McConnell (referred to by Koenig, 2000) credits the flow of formal and informal information up, down and across the enterprise as the source for improvements in operational productivity. Kanter, after investigating innovations by middle managers, formulated recommendations for organizational support of creativity that included "a free and somewhat random flow of information" (referred to by Koenig, 2000, p. 91). She also asserts that a manager's needs are information, resources and support, in that order.

Research has developed a positive correlation between professional level employees' productivity and the amount of time spent reading. Koenig (1999) cites research by Mondschein, Ginman, King Research, Inc. and others to validate this theme of greater access to and use of information services by more productive individuals across all findings.

Knowledge workers consistently spend about 20-25% of their time to access and use information. Also, individuals intuitively cease information seeking after spending 20-25% of their time doing so because a) other work-related tasks have become more important and b) they perceive further effort will yield insufficient results to warrant more time expenditure. A lower percentage would indicate the desired information is found. Since this percentage remains constant across companies and industries, the correct information or all the required information required may not be consistently found. It makes sense for an employer to provide the most relevant information resources possible to increase effectiveness of employees information seeking.

Various approaches have been used to calculate the effect of information as a factor in industrial productivity. Hayes and Erickson (referred to in Koenig, 2000) used the Cobb-Douglas formula in 1982. Braunstein (referred to in Koenig, 2000) incorporated the constant

elasticity of substitution and the translog production functions into the Cobb-Douglas formula in 1985 to produce a consistent 2.34:1 ratio, e.g. each unit of information service input yields 2.34 units of output value. King Research, Inc.'s ratio of 2.2:1 for the Department of Energy's Energy Database and a 1.98:1 ratio for NASA's information services are very similar though they did not use the Cobb-Douglas formula in any form.

Matarazzo, Prusak and Gauthier in 1990 and Matarazzo and Prusak in 1995 conducted studies on the value senior executives placed on information centers and information professionals. They used a trend analysis technique to profile corporate libraries. Results reveal the value or impact of the library or information center increases when it is closely aligned with the more strategic pieces of the parent organization. A deep understanding of the parent's business and industry and market in which it operates is essential to delivering more complex services such as data analysis. Data analysis was cited as a primary example of a skill that could be developed to enhance the library or information center's contribution to its parent.

Other findings include greater end-user access to information which then requires increased training on selection and use of information resources; reduction in size or stagnant growth of library or information center staff, space requirements, and budgets; adoption by information professionals of a more proactive stance in delivering information. However, no determination was made as to which factors contribute most to corporate productivity (Matarazzo et al. 1999; Matarazzo and Prusak, 1999).

METHODOLOGY

Unlike companies in the industrial age when hard assets represented value, software and service companies' value in the information age resides almost exclusively in intellectual assets. The extraordinary degree to which knowledge comprises software and services working capital, coupled with the fact that this industry has not been the focus of prior studies, makes them an ideal and interesting candidate for this study. "Because knowledge has become the single most important factor of production, managing intellectual assets has become the single most important task of business", Steward (1997, p. xiii).

The software and services companies listed in the Software Magazine's 2001 Software 500, serves as the survey population for this study. This list is published annually in the June/July issue, and is available electronically on the internet (Frye, 2002). Public and private companies selling business software and services across numerous diverse industries are ranked according to *total worldwide software and services revenue* for calendar year 2000. This figure is used by Software Magazine in determining rank rather than total corporate revenue because some companies have other lines of business. In calculating revenue per employee for purposes of this study, total corporate revenue was used since library and information centers and information professionals serve the entire company. *Software Magazine's* annual vendor survey, public documents, press releases, SEC filings, and industry analysts served as the source for the employee and financial information.

Data was collected using an email survey instrument. The survey could not be anonymous since data was correlated according to the productivity measure of revenue per employee ranking of respondent. To mitigate participant concern about release of competitive intelligence, individual responses are known only to the researchers. The findings are presented only in aggregate form with individual responses not attributed to any named person or company.

The survey was structured to identify companies that had libraries, librarians or information centers. Participants from companies without libraries, librarians or information centers were asked to identify content purchased and where the company got the content it used. Companies with libraries, librarians or information centers were asked twenty questions. Since the research objectives were to define characteristics of library or information centers and librarians, questions were aggregated into the following segments: General Information, the Parent Organization, the Information Staff, the Library or Information Center Organization and Company Return on Investment and Customers. Types of data collected include:

Library or Information Center -

- Number and placement of library or information center(s) within the organization
- Number and placement of librarian or information professional(s)within the organization
- Reporting structure for highest ranking library or information center staffer
- Staffing by category of work (professional, para-professional, clerical or technical), employee status (full, part-time or contractor/outsourced), and experience
- Staff professional development requirements
- Source of funding and allocation
- Services offered in the physical location
- Services offered in a virtual location
- Content purchased
- Measures of return on investment
- Ranked (by strategic value) customer segments
- Ratio of staff to potential and actual customer base

Librarian or Information Professional -

- Level of Education
- Tenure at current organization
- Prior information industry experience
- Title
- Professional development activities

The survey questionnaire was pre-tested by four Fortune 500 corporate information professionals in the Dallas/Ft. Worth metroplex area. These professionals have over 80 years of combined information industry experience. They offered a number of suggestions that contributed to the general organization of the survey. Recommendations included clarifying desired context of responses from the perspective of the individual or the company, categorizing multiple data points in single questions and structuring the survey so that participants without libraries, information centers or information professionals completed fewer questions.

An Access database of the 500 largest Software companies was constructed to include ranking, company name, contact name, title, telephone number, email address, mailing address, revenue, headcount and revenue per employee. Since the primary goal of this research is to profile librarians and existing library or information center operations, surveys were sent to the library or information center director or manager in a firm. Library professionals would be most knowledgeable and would be more likely to respond to the survey. Company contact names were developed using the Special Libraries Association Who's Who member directory and the Directory of Special Libraries and Information Centers. If no library professional could be identified, surveys were sent to administrators or officers of a companies who held the position of chief intelligence officer (CIO), chief technology officer (CTO), chief knowledge officer (CKO), or marketing manager.

All survey respondents were asked to provide title and area of responsibility. Participants from companies with a library or information center or information professionals (defined as individuals with Masters of Library Science, Masters of Information Science or Masters of Library and Information Science) were immediately redirected to the Parent Organization section which begins the principle twenty-question survey. Participants with no library or information center or librarians were asked to describe the information content used by their company and how they retrieve that information.

A total of 500 emails were sent. Each email contained a brief introduction of the investigator, the purpose and scope of the research, and the survey. To ensure identification of the source of a response, each survey carried the recipient's Software 500 rank number. Surveys were not sent to organizations if a contact was not identified. A number of surveys were returned as undeliverable for a variety of reasons. Attempts were made to identify an alternative contact and, if successful, the survey was resent. A "second request" was sent to recipients with valid addresses who had not responded within five days. The initial analysis of the survey responses found a total of 25 surveys have been returned to date of which 23 were usable for a 4.6% response rate. Corrected names, titles, and email addresses are being compiled for emails from the initial mailing that were returned as undeliverable. Final results will be reported at the 2002 Special Libraries Annual Conference in Los Angeles, Calif.

RESULTS AND DISCUSSION

Preliminary Findings

Analysis of the responses from the first mailing yield interesting findings concerning companies with formal libraries or information centers and those without a traditional library or information canter. Of the twenty-three respondents to the survey, fifteen of the software companies reported they have no library or information center. Fourteen of these responding companies do not employ a librarian or information professional with a master's degree in library or information science. One company did state that while there is no physical library or information center, there is an enterprise information resource that includes some of the materials typically found in a library. They also employ an individual to assist employees with their information needs.

The information content used and purchased by software and services companies with and without libraries or information centers was very similar. Table 1 presents a listing of the content identified by both groups. Over three-fourths of both groups of respondents cited business and management resources, directories, journals and magazines, market research reports and online services. Software and services companies *without* libraries, information centers, or information professionals, also responded that they purchased software (81.3%). The responding companies *with* a library also purchase Wall Street Analyst reports and benchmarking studies.

Table 1.

Content Use By Companies With And Without Libraries Or Information Centers

Type of Content		Organizations w/no Library	Organizations w/ a Library
Analyst (Wall Street) Reports	YES	68.8	85.7
	NO	31.3	14.3
Benchmarking Studies	YES	37.5	71.4
	NO	62.5	28.6
Business/Management Resources	YES	81.3	85.7
	NO	18.0	14.3
Books/CDs/DVDs	YES	68.8	71.4
	NO	31.3	28.6
Conference Proceedings	YES	56.3	57.1
	NO	43.8	42.9
Directories	YES	75.0	85.7
	NO	25.0	14.3
Documentation	YES	50.0	42.9
	NO	50.0	57.1
e-Based Subscriptions (such as eZines)	YES	56.3	71.4
	NO	43.8	28.6
Journals/Magazines	YES	93.8	85.7
	NO	6.3	14.3
Market Research Reports	YES	87.5	100.0
	NO	12.5	00.0

Newspapers	YES	56.3	85.7
	NO	43.8	14.3
Online Services (e.g. Dow Jones, Bloomberg)	YES	75.0	85.7
	NO	25.0	14.3
Software	YES	81.3	42.9
	NO	18.8	57.1
Standards	YES	31.3	42.9
	NO	68.8	57.1
Technical Reports or White Papers	YES	75.0	57.1
	NO	25.0	42.9
Technical Certification Practice Exams	YES	18.8	28.6
	NO	81.3	71.4

The software and services companies *without* a library or formal information provider find and retrieve their information from the internet (82.4%), market research companies (88.2%), professional or industry associations (88.2), and from e-based content vendors (70.6%). Although they do not have a traditional corporate library or information center or a trained librarian, these companies are able to meet their information needs. Much of the critical information content used in the software business is available on the Internet, through online vendors, and through other digital technologies. A great deal of this information is available instantaneously through digital transmission.

It is interesting that only slightly more than one-half of these companies use a formalized information system or intermediary such as a consultant (62.5%) or information broker (52.9%). Online access to new and more sophisticated information technologies, the internet, databases, and other digitally published resources is advantageous for an organization without a library or information intermediary, enabling them to meet the business information needs of these users.

Table 2

Where do organizations without libraries get information content?

Content Organizations (n = 17)	Yes	No
Consultants	62.5	37.5
e-Based Online Content Vendors (e.g., Dunn & Bradstreet, Dow Jones, etc.)	70.6	29.4
Information Broker or Independent Researcher/Research Firm	52.9	47.1
Internet	82.4	17.6
Market Research Companies (e.g., Gartner, IDC, Giga)	88.2	11.8
Professional or Industry Association	88.2	11.8
Standards Organization	52.9	47.1

Preliminary findings from the survey show that 30.4% of the responding twenty-three companies have a library or information center. Five of the seven libraries noted that their senior information professional reports to administrators in the marketing departments of their companies. Little has changed in this aspect of a library or information center manager's reporting structure. Only three out of one hundred sixty-four librarians participating in a 1990 survey reported to someone with a library or information center background. (Matarazzo et al., 1999). Almost half (42.9%) of the library and information centers are funded as part of the operations budget of the company, while two (28.6%) are considered corporate overhead.

Respondents from companies with libraries or information centers report offering many services to their customers. Table 3 lists services cited. The majority of noted services provide access to information resources or content such as company information (85.7%), journals and newspapers (71.4%), information services such as conducting business or corporate intelligence research (71.4%), researching special projects (71.4), or providing instruction on use of information resources (71.4). As a result of the introduction of digital information technologies and web-based information resources, the information professional's role as intermediary has become more important. Training users on information tools and their use has become an important service. Information professionals now find themselves playing the role of facilitator and trainer as opposed to the past emphasis of information provider. (Strouse, et al, 2001) The librarians also report providing more in depth research services, including primary research and quantitative analysis as a result of more accessibility to information resources through online technologies.

Services offered by a librarian, library or information centers were most valuable to company executives and to employees in the marketing, consulting, and sales departments. Products and services most requested were market analyst research, financial reports or company information and competitor tracking.

Table 3

Services Offered By The Library Or Information Center

Services	Percentage
Circulation – Content	
Journals	71.4
Newspapers	71.4
Content Management	
Develop and/or manage internally developed databases such as technical reports or training materials	57.1
Manage journal subscription for the library or information center	57.1
Purchase content held or managed by the library or information center	57.1
Reference / Research	
Conduct business or competitive intelligence to support strategic/tactical decision making	71.4
Company information – public and private – national and international	85.7
Maintain general overall awareness (e.g. market conditions, customer needs, etc.)	71.4
On demand research including searching online databases, the Internet or other specialized resources	71.4
Research to support special project assignments such as competitive reviews	71.4
Targeted news services (selective dissemination of information) that distributes or circulates (electronically or in hard copy) articles, market research or other focused content	71.4
Ready reference	71.4
Services	
Reading Room	57.1

Technology / Tools	
Develop and/or maintain an information portal on the organization's intranet	57.1
Training	
General instruction on selection and use of appropriate library or information center managed information resources	71.4
Instruction on use of targeted resources for specific end results (e.g., use of market research to build on competitive advantage)	57.1

The companies with libraries do report participation in the development and maintenance of their firm's intranet. Developing, creating, and managing information content for the company intranet allows information professionals to bring information closer to the point of need of users. With intranet access more relevant information is delivered to company users at their convenience, which potentially can be 24 hours a day, seven days of the week 365 days a year. Access to information on the intranet makes resources accessible to formerly underserved and remote users.

Table 4 lists services or content that these libraries offer on the company intranet.

Table 4

Information Services Or Content On The Library Or Information Center Intranet

Services or Content	
Access to external information databases (e.g. Factiva.com)	85.7
Analyst (Wall Street) Reports	57.1
Company/Industry information (companies outside of organization)	71.4
Links or pointers to selected Internet sites	71.4
Links or pointers to other internal intranet sites (e.g. product group sites)	71.4
Market research reports	71.4
Reference or research request forms	71.4
Topic pages aggregating resources for a specific audience	71.4

Information and services accessible from the company intranet include access to external information databases, company and industry information, links to other internet and intranet sites, and market research reports. The intranet also serves as a two-way communication link with the library or information center's customers. 71.4% of the respondents report a form to request research is also accessible from their firm's intranet.

Preliminary findings reported in Table 5 indicate that demonstrating return on investment (ROI) continues to be a challenge for libraries and information centers. The measurement of ROI is something that corporate executive use to determine the value of any business segment to the organization. Demonstrating ROI allows information center customers and corporate management to understand the benefits received from the corporate library or information centers staff, resources, and services. Respondents most frequently (71.4%) report a traditional measure, collecting and reporting customer and staff interactions, to upper management to demonstrate return on investment to upper management. While this metric demonstrates usage, it does not serve as an indicator of the *value* of library or information center services. Other traditional measures used somewhat frequently (42.9%), are customer circulation statistics and savings from consolidated purchasing. User time saved, which can be converted to a dollar savings to illustrate a bottom line contribution, are also used only somewhat frequently (42.9%) while a measure with great impact, sales attributed to library services, is used infrequently (28.6%).

Table 5

How Libraries Demonstrate Return On Investment To Upper Management

ROI Data	Yes	No
Organizations (n=7)		
Customer circulation statistics	42.9	57.1
Customer & staff interactions	71.4	28.6
Sales attributed to library services	28.6	71.4
Savings in consolidated buying	42.9	57.1
User time saved	42.9	57.1
Other (Intranet usage & customer Satisfaction survey)	8.7	82.6

SUMMARY, MAJOR FINDINGS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

Summary

A body of research across several disciplines firmly establishes a relationship between corporate productivity and information services. Access to information and the flow of information positively impacts productivity, even though most corporations historically underinvest in their information environment.

The more egalitarian the culture, the greater the sharing of information and knowledge. In fact, emphasizing the proprietary nature of information tends to be counterproductive. This is especially true in more information-intensive industries.

A review of the characteristics of knowledge workers tells us that the way to increase their productivity is to increase the effectiveness of their information and knowledge seeking. Also, the degree to which information systems are used directly correlates with organizational productivity.

Little recent research has been done on the relationship of productivity and libraries and librarians, and nothing of consequence since the rise of the World Wide Web (WWW) and intranets. Preliminary findings from this study do not reveal specific services unique to highly productive companies. They do show that new technologies such as the internet, the prevalence of sophisticated information systems, and the ready availability of the information needed by software and services company employees in e-format have enabled direct access to the information required in software and services companies.

Larger companies with higher revenue per employee rates are making the investment in formal information services organizations but smaller companies can produce high revenue per employee rates without formal information services. Information professionals in company libraries are utilizing their company's intranet to deliver resources and to communicate with their customers.

> "The only irreplaceable capital an organization possesses is the knowledge and ability of its people. The productivity of that capital depends on how effectively people share their competence with those who can use it."
>
> Andrew Carnegie
> Source: Stewart (1997 p. 128)

Recommendations for Further Research

Based on preliminary findings, an alternative measure of productivity, profit per employee, should be the measure of productivity in future studies to account for the wide range of the variable, number of employees. Median revenue per employee among private software

firms under $25 million revenue is $108,173 vs. $207,290 for the top eleven software companies, a 92% difference (Hadley, 2002). Yet a comparison of the under $25 million firms' profit per employee of $7,979 to the $9,009 profit per employee of the top eleven software companies produces only a 13% delta. The profit per employee would produce a more succinct peer to peer company comparison.

Reproduction of this study in a second information intensive industry segment such as the legal profession could produce additional data. The data could be compared to, and possibly aggregated with, the software and services industry data to develop operational models and optimum services that would yield the greatest productivity gains for companies.

Final recommendations will be presented at the 2002 Special Libraries Association Annual Conference in Los Angeles, California.

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APPENDIX A – SURVEY QUESTIONNAIRE

INTRODUCTION

My name is Margaret Carroll and I am a student in the Interdisciplinary Ph.D. Program in Information Science at the University of North Texas.

My research interest is the contribution information centers, libraries, and information professionals make to their organization's productivity. Objective of this survey is to construct profiles of these categories of information resources in Software Magazine's 2001 Software 500. It forms the basis of deeper research which will ultimately focus on causality factors influencing degree of contribution to productivity. Research in these areas could be used to develop staffing and resource allocation guidelines, services selection, and return on investment models.

While this survey is not anonymous to the researcher, findings will be presented in **aggregate form only** with individual responses not attributed to any named individual or organization. If you complete this survey, you are implying consent for the information to be used in aggregate form. You are free to withdraw your consent and cease participation at any time. Participants will receive a blind partner summary of findings.

If you have any questions you may contact me via email (mc0010@unt.edu) or by phone 817-797-3919. You can also ask questions of my faculty advisor, Dr. Yvonne Chandler, via email to chandler.lis.admin@unt.edu.

Submit the completed survey via email to mc0010@unt.edu. *Reply within 1week of receipt of the survey* would greatly facilitate this project. Your contribution to this research is very much appreciated.

General Information (001):
What is your title and area of responsibility?

Name/Title:	Primary area of responsibility:

Does your organization have a Library or Information Center?

Yes:	Don't know:
No:	Other (specify): **(Skip to Part A: Question #1** – you may forward survey to library info. Ctr. Director to complete.)

Does your organization have information professionals, individuals with Masters of Library Science, Masters of Information Science, or Masters of Library and Information Science, performing duties usually associated with librarians or research analysts?

Yes:	Don't know:
No:	Other (specify): **(Skip to Part A: Question #1** – you may forward survey to library info. Ctr. Director to complete.)

What kind of content is purchased by your organization? **Check all that apply.**

	Sources		**Sources**
	Analyst (Wall St.) Reports		Online services (e.g. D & B, Dow Jones Interactive, NewsEdge, Lexis-Nexis)
	Benchmarking studies		Software
	Business / Management resources		Standards
	Books / CDs / DVDs		Journals / Magazines
	Conference Proceedings		Market Research Reports
	Directories		Newspapers
	Documentation		Technical Reports or White Papers
	e-based subscriptions such as eZines		Technical certification practice exams
Other (specify):			

Where does your organization get the content it uses? **Check all that apply.**

	Author		Internet
	Bookstore		Market Research Co (e.g. Gartner, IDC)
	Colleagues outside of your organization		Professional Associations
	Consultants		Standards Organizations
	ebased Online Content vendor (e.g., D & B, Dow Jones, etc.)		Subscription Service(s)
	Governmental or Municipal Agency or Government Publishing Office		Training vendors
	Information Broker or Independent Researcher / Research firm		Other (specify):

END OF SURVEY UNLESS YOU HAVE BEEN RE-DIRECTED TO QUESTION #1.

Thank you for your participation!

Part A: The Parent Organization

1) Indicate library or information center location(s) in the organization's hierarchy:

Your library or information center's Location in the	**No. and location** of **other** libraries &/or information centers in	Organization unit to which a library or information center reports

organization	the organization	
		Corporate Support Services
		Consulting / Professional Services
		Education and Training
		IT / IS (technology) group
		Legal / Regulatory Compliance
		Library / Information Center
		Planning – Business Group
		Planning – Corporate Group
		Planning – Division Group
		Research & Development / Technology
		Sales / Marketing
		Sales / Business Development
		Other (specify):

2) If you are not located in the library or information center, indicate your location in the organization.

Your location in the organization	Organization unit to which **YOU** report
	Competitor Intelligence
	Corporate Support Services
	Consulting / Professional Services
	Education and Training
	IT / IS (technology) group
	Legal / Regulatory Compliance
	Library / Information Center
	Planning – Business Group
	Planning – Corporate Group
	Planning – Division Group
	Research & Development / Technology
	Sales / Marketing
	Sales / Business Development
	Other (specify):

3) Indicate no. and location in organization of any information center **staff** not house in the library or information center?

Number of Professional or Technical	***No. of Para-professional or clerical***	***Location of staff***
		Competitor Intelligence
		Corporate Support Services
		Consulting / Professional Services

		Education and Training
		IT / IS (technology) group
		Legal / Regulatory Compliance
		Library / Information Center
		Planning – Business Group
		Planning – Corporate Group
		Planning – Division Group
		Research & Development / Technology
		Sales / Marketing
		Sales / Business Development
Other (specify):		

4) To whom does the highest-ranking information center or library center staff person report?

Title:	Primary area of responsibility:

Part B: The Information Staff
(If known, answer for <u>all</u> libraries or information centers in the organization.)

5) List the ***number of library or information center(s) staff*** next to the category that best describes the primary tasks on which the majority of their time is spent. Count an employee only once.

Employees Categories	**# of Full Time**	**# of Pt. Time**	**Contractors / Outsource Personnel**
Information Professional(s) - IP (Performing duties usually assigned to individuals with an MLS, MIS, MLIS, MBA Degree or equivalent experience)			
Para-professional(s) - PP (Performing duties usually assigned to individuals with a Bachelors degree, a specialized information skill such as acquisitions or circulation or 1+ years information center experience)			
Clerical - C (Performing duties usually assigned to individuals with no degree or IS experience)			
Technical - T (Primarily performing duties involving software development / intranet or web work or database administration involving hardware or networks)			

6) What ***library or information center experience does your staff have?*** Account for employees in the same category assigned in question #5 by placing them in the number of years experience range. **Count an employee only once.**

Experience in *your* organization	**<1 year**	**1-3 years**	**4-5 years**	**6-10 years**	**11-15 years**	**15+ years**
Information Professionals - **IP**						
Para-professionals - **PP**						
Clerical - **C**						
Technical - **T**						

***Previous* experience in library or information center**	**<1 year**	**1-3 years**	**4-5 years**	**6-10 years**	**11-15 years**	**15+ years**
Information Professionals - **IP**						
Para-professionals - **PP**						
Clerical - **C**						
Technical - **T**						

7) What are the job titles of the IS staff? Note number of staff holding each title, counting an employee only once. Categorize each title selected as IP, PP, C or T as listed in question #5.

Title	***# of staff***	***Segment***	***Title***	***# of staff***	***Segment***
Administrator			Library Assistant		
Analyst			Library Technician		
Assistant			Manager or Supervisor		
Cataloger			Programmer		
Clerk			Project Manager		
Consultant			Reference		
Content Manager			Researcher		
Database Administrator			Supervisor		
Director			Systems Librarian		
Editor			Team Lead		
Knowledge Architect			Web Master / Editor		
Knowledge Manager			Web Designer		
Other (specify):					

8) What is the IS staff's educational background? Note number of staff next to highest level they have achieved. **Count each employee only once.**

	Associates Degree	*Bachelors Degree*	*Masters*	*2nd Masters*	*Ph.D.*	*Other*
Information Professionals - **IP**						
Para-professionals - **PP**						
Clerical - **C**						
Technical - **T**						

9) Do you require a 2nd subject specific Masters for **ANY** information center staff position?

____yes	Subject(s):
____ no	___ don't know

10) Does your organization have a minimum number of training hours information center staff must complete annually for professional development?

____ yes	Numbers of hours:
____ no	___ don't know

11) How does the staff obtain professional development training? (Check all that apply.)

__ Conference attendance
__ Continuing education classes at a college or university
__ Continuing education classes sponsored by a Professional Assn
__ In-house training classes
__ Tuition reimbursement for coursework leading to a degree
__ Vendor instruction
__ Other (specify): _____
__ Do not know: _____

Part C: The Library or Information Center Organization
(If known, answer for all libraries and information centers in the organization.)

12) How is the library or information center function funded? (Check all that apply.)

_____ Allocation to departments based on a formula

_____Allocation to departments based on usage
_____As part of the operations budget of its owning unit
_____Costs are covered through charge backs - (____ % if less than 100%)
_____Library or information center budget is funded as corporate overhead
_____Per charge head across the enterprise
_____Other (specify): _____

13) Can you provide a dollar range representing the organization's total library or information center budget?

Estimate:
Don't know:

14) List budget allocation **percentage to total 100%**:

Percentage	**Allocation**
	Depreciation
	Equipment / Hardware / Software
	Information Resource acquisitions (e.g. books, serials, videos, CDs, software)
	Online Information Resource Acquisition Accessible only by IS Staff (e.g. Dialog, LexisNexis)
	Online Information Resource Acquisition Accessible across the enterprise (e.g. Factiva.com)
	Operational overhead (facilities, etc)
	Rewards / Recognition / Morale
	Staff salaries & Benefits
	Professional Development (e.g. Association memberships, training)
	Travel
	Other (specify):

15) What services are offered by ***all of your organization's*** library or information centers or by information professionals based in other areas of your organization? **Check *all* that apply.**

Circulation - Content: Audios/Videos/DVDs___ Books ____CDs ____ Conference Proceedings ____ Journals____ Market Research ____ Newspapers____ Patents ____ Software____ Standards____ Other (specify):
Circulation – Hardware: PC ___ Digital Camera ____ Scanner____ TV ____ VCR/DVD players ____ Other (specify):
Content Management: ____Evaluation ____Develop and/or manage internally developed databases such as technical reports or training materials ____Negotiate/enforce electronic licensing contracts ____Manage journal subscriptions for the library or information center

____Manage journal subscriptions for customers ____Manage market research and analyst relations ____Purchase content housed in or managed by the library or information center ____Purchase content housed in or managed by an organizational customer group
Knowledge Management: ____Knowledge architecture consulting (e.g. search structure strategies, taxonomy or meta-data/thesaurus development) ____Integrate internal and external content databases ____Manage internally generated proprietary content ____Other knowledge management initiatives (specify) _____
Records Management: ____Archives ____Engineering notebooks or other technical logs or maps ____Manage an organizational museum ____Capture oral histories ____Preservation ____Records access, storage and retention
Reference / Research: ____Business or Competitive Intelligence to support strategic/tactical decision making ____Company information – Public and private – national and international ____Data analysis as part of a research deliverable ____Maintain general overall awareness (e.g., market conditions, customer needs, etc.) ____On demand research including searching online databases, the internet or other specialized resources ____Patent research and analysis ____Research to support special project assignments such as competitive reviews ____Targeted news services (selective dissemination of information) that distributes or circulates (electronically or in hard copy) articles, market research or other focused content ____Ready reference ____Other (specify):
Miscellaneous Services: ____Book club with regular discussion sessions (technical ____ or business____) ____PC access ____Photocopier / printer ____Proctor exams (e.g. technical certifications, university qualifying exams, etc.) ____Site or branch libraries with highly target collections in strategic locations ____Study carrels ____TV / VCR
Technical Services: ____Accept donations or gifts ____Cataloging / classification of collection ____Document delivery ____Inter-library loan ____Journal/Serials management ____Standing order management

Technology/Tools: ____Develop and/or maintain an information portal on the organization's *intranet* ____Develop and/or maintain the organization's *internet* ____Develop and/or maintain access to external databases ____Develop and/or maintain the library or information center's administration system (e.g. online catalog)
User Training: ____General instruction on selection and use of appropriate library or information center managed information resources ____ Instruction on use of the Online catalog ____Instruction on use of targeted resources for specific end results (e.g. use of market research to build competitive advantage)
Other (specify):

16) What information services or content is offered on the library or information center's ***INTRANET*** portal? **Check all that apply.**

	Content or Service
	Access to external information databases (e.g. Factiva.com)
	Analyst (Wall St.) Reports
	Company / Industry information (companies outside of organization)
	Document delivery request
	Documentation / standards
	eZines / eBooks
	Links or pointers to selected ***internet*** sites
	Links or pointers to other internal ***intranet*** sites (e.g. product group sites)
	Market Research Reports
	Online catalog of library or information center holdings
	Online training on selection and use of information resources
	Reference or research request
	Targeted new services (Selective Dissemination of Information)
	Topic pages aggregating resources for a specific audience
	Other (specify):

17) What kind of content is purchased by your organization? **Check all that apply.**

	Sources		**Sources**
	Analyst (Wall St.) Reports		Online services (e.g. D & B, Dow Jones Interactive, NewsEdge, Lexis-Nexis)
	Benchmarking studies		Software
	Business / Management resources		Standards
	Books / CDs / DVDs		Journals / Magazines
	Conference Proceedings		Market Research Reports

	Directories		Newspapers
	Documentation		Technical Reports or White Papers
	e-based subscriptions such as eZines		Technical certification practice exams

Part D: Company Return on Investment and Customers

18) Rank the strategic value to the parent organization of library or information center services major customer groups with **one (1) being most important**. Which service(s) does each use most frequently?

Group / Unit	**Ranking**	**Service(s) most frequently used**
Company Executives		
Sales		
Consulting		
Manufacturing		
Human Resources		
Manufacturing		
Operations		
R & D		
Product Development		
Finance		
Operations		
Product Support		
Legal		
Training / Education		
Marketing		
Public / Investor Relations		
Other (specify):		

19) What is the ratio of library or information center staff to customers?

Number of actual customers vs. staff:	
Number of potential customers vs. staff:	
Don't know:	

20) What data do you collect to illustrate return on investment to upper management?

____Customer circulation statistics
____Customer testimonials as to library and/or information center contributions
____Direct savings attributed to library and/or information center contributions
____Sales attributed to library and/or information center services or deliverables
____Savings in consolidated buying
____User time saved
____Other (specify): _____

Comments:

---------- **END OF SURVEY** ----------

Thank you for your participation!

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Collaborative Marketing: Library and Vendor Partnerships

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ISSUES

The move to electronic access has presented multiple issues for librarians. One issue centers on the need to inform users about the availability of proposed or new Web-based resources. This has been a traditional marketing issue.

Another issue involves the need to continuously train and update this evolving user base as Web-based resources are introduced in a pre-sales environment or updated in a post-sales environment. This traditionally has been an educational concern. The number of different Web resources available and the fact that there are few opportunities for individual or on-site formal training complicate this onerous task

Both issues assume even greater importance when we factor in the emphasis now being placed on usability reports as a tool to justify both initial purchases and renewal options.

SHARED RESPONSIBILITY

At ISI we feel that these issues are of equal concern to librarians and vendors and that we should share the responsibility for their resolution. We are in a good position to do so based—to a large degree—on the input from our customers. From the first release of our electronic products, we have developed marketing and training aids. What we are doing now that is different is developing these aids in a Web format and working even more closely with the library community so that they are made aware of their availability.

Today, these approaches have been centralized on the ISI Web site in a Library Resource Center that is available in multiple languages. We continue to expand this site and to work directly with institutions to customize materials.

UNITED KINGDOM COLLABORATIVE APPROACH

The ISI UK marketing staff—working closely with Account Managers throughout Europe, the Middle East and Africa—have been instrumental in building a Web-based Library Resource Center. This electronic library was first conceived in a conversation over two years ago with Jan Haines, Head Academic Library Services and Anthony Brewerton, Subject Team Leader for Arts, Social Sciences and Health Care, Oxford Brooks University.

At their institution, they displayed materials that they had put together to promote *ISI Web of Science*® and mentioned to the ISI UK staff how useful it would be to have easy access to electronic promotional material to download and distribute to users. From this informal request, the concept for a Web-based Library Resource Center was born.

Working with this initial request, in 1999, ISI staff in the United Kingdom expanded the idea and conceptually designed Web pages that would increase awareness and usage and tested the concept by interviewing librarians in the United Kingdom, France, Germany, and Spain. Several librarians endorsed the concept and were instrumental in shaping the electronic materials.

Consequently, the UK staff designed a Library Resource Center of promotional and marketing materials in four languages that included animated banners, color posters, interactive multimedia, e-Cards, demos and logos, and graphics. Concurrently, they developed a section so that educational and training materials would be easily accessed.

This was the first acknowledgement that the two issues or challenges – marketing and education – could be resolved via the Web in a parallel approach.

These materials were organized by language – English, French, German and Spanish – and then by product and made accessible via the ISI European Web site. Suggestions were added on how to use these marketing materials. For example, adjacent to the logos and graphics section were the instructions: "Use ISI product logos and graphics to customize your own promotional materials."

Identifying library staff at selected institutions, ISI publicized the availability of these marketing materials. Reaction was very positive, and the materials were used within these communities to the benefit of the library and ISI. Usage of ISI products increased as library staff and patrons became more aware of database availability and specific product access, without additional direct promotional cost to the library.

Some librarians requested permission to customize materials. The idea has been refined at such institutions as RBT (Riksbibliotektjenesten) in Norway who asked for customization of html pages so that they could insert their library logo and provide an alternate page in Dutch that linked to translated ISI-produced training material. See figure 1 and figure 2.

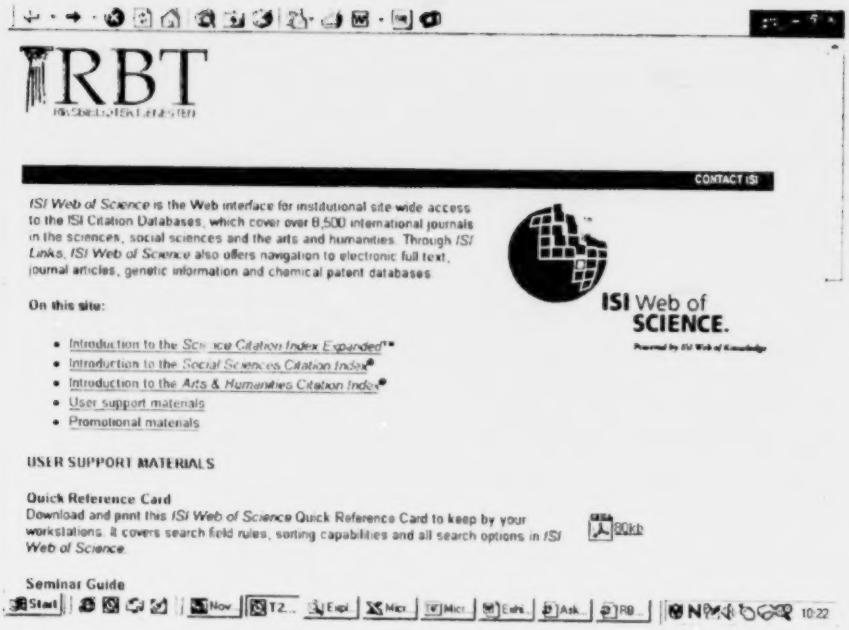
RBT
CONTACT ISI
ISI Web of Science is the Web interface for institutional site-wide access to the ISI Citation Databases, which cover over 8,500 international journals in the sciences, social sciences and the arts and humanities. Through ISI Links, ISI Web of Science also offers navigation to electronic full text, journal articles, genetic information and chemical patent databases.
ISI Web of SCIENCE.
On this site:
Introduction to the Science Citation Index Expanded™
Introduction to the Social Sciences Citation Index®
Introduction to the Arts & Humanities Citation Index®
User support materials
Promotional materials
USER SUPPORT MATERIALS
Quick Reference Card
Download and print this ISI Web of Science Quick Reference Card to keep by your workstations. It covers search field rules, sorting capabilities and all search options in ISI Web of Science.
80kb
Seminar Guide
Start
10:22

Figure 1.

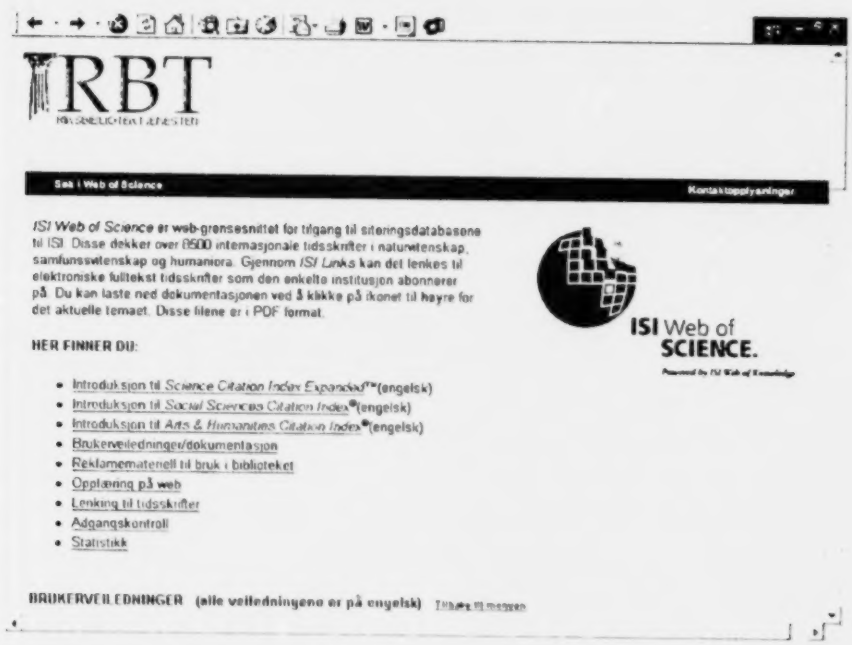
RBT
Søk i Web of Science
Kontaktopplysninger
ISI Web of Science er web-grensesnittet for tilgang til siteringsdatabasene til ISI. Disse dekker over 8500 internasjonale tidsskrifter i naturvitenskap, samfunnsvitenskap og humaniora. Gjennom ISI Links kan det lenkes til elektroniske fulltekst tidsskrifter som den enkelte institusjon abonnerer på. Du kan laste ned dokumentasjonen ved å klikke på ikonet til høyre for det aktuelle temaet. Disse filene er i PDF format.
ISI Web of SCIENCE.
HER FINNER DU:
Introduksjon til Science Citation Index Expanded™(engelsk)
Introduksjon til Social Sciences Citation Index®(engelsk)
Introduksjon til Arts & Humanities Citation Index®(engelsk)
Brukerveiledninger/dokumentasjon
Reklamemateriell til bruk i biblioteket
Opplæring på web
Lenking til tidsskrifter
Adgangskontroll
Statistikk
BRUKERVEILEDNINGER (alle veiledningene er på engelsk)

Figure 2.

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EXPANSION OF THE ISI ELECTRONIC LIBRARY CENTER

Because of the success of the European program, ISI has integrated this model into the main ISI Web site and expanded the concept so that all regions of the world can utilize it. The main site's Library Resource Center is segmented so that a librarian can easily select promotional material to identify and download training aids. Researches or users are directed to a section of the Library Resource Center that includes tutorials and other educational aids.

HOME | ABOUT ISI | PRODUCTS | NEWS | CONTACT US | www.isinet.com
SEARCH
PRESS ROOM
EXHIBITIONS
WHAT'S NEW IN RESEARCH
REGIONS & TRANSLATIONS
PRIVACY
LANGUAGES
ISI Web of KNOWLEDGE
Transforming Research
Anne Kågedal, a librarian at the Karolinska Institutet in Stockholm, Sweden, ISI Web of Science is a key tool she uses to help more than 5,000 students and medical researchers search the primary literature.
Resource Center for Librarians
ISI Web of Knowledge
ISI Web of Science
ISI Proceedings
ISI Current Contents Connect
Derwent Innovations Index
BIOSIS Previews
ISI Chemistry
ISI JCR Web
ISI Essential Science Indicators
Dr. Bengt Samuelsson at the Karolinska Institutet in Stockholm, Sweden. His discoveries about hormone-like substances called eicosanoids have advanced the treatment of asthma and other inflammatory conditions.
Resource Center for Researchers
ISI Web of Knowledge
ISI Web of Knowledge
ISI Web of Science
ISI Proceedings
ISI Current Contents Connect
Derwent Innovations Index
BIOSIS Previews
ISI Chemistry
ISI JCR Web

Figure 3 shows the main portal page for the Library Resource Center in English. Notice that there are two options. A visitor to the site can choose to follow the Librarian or Researcher path and do so by product.

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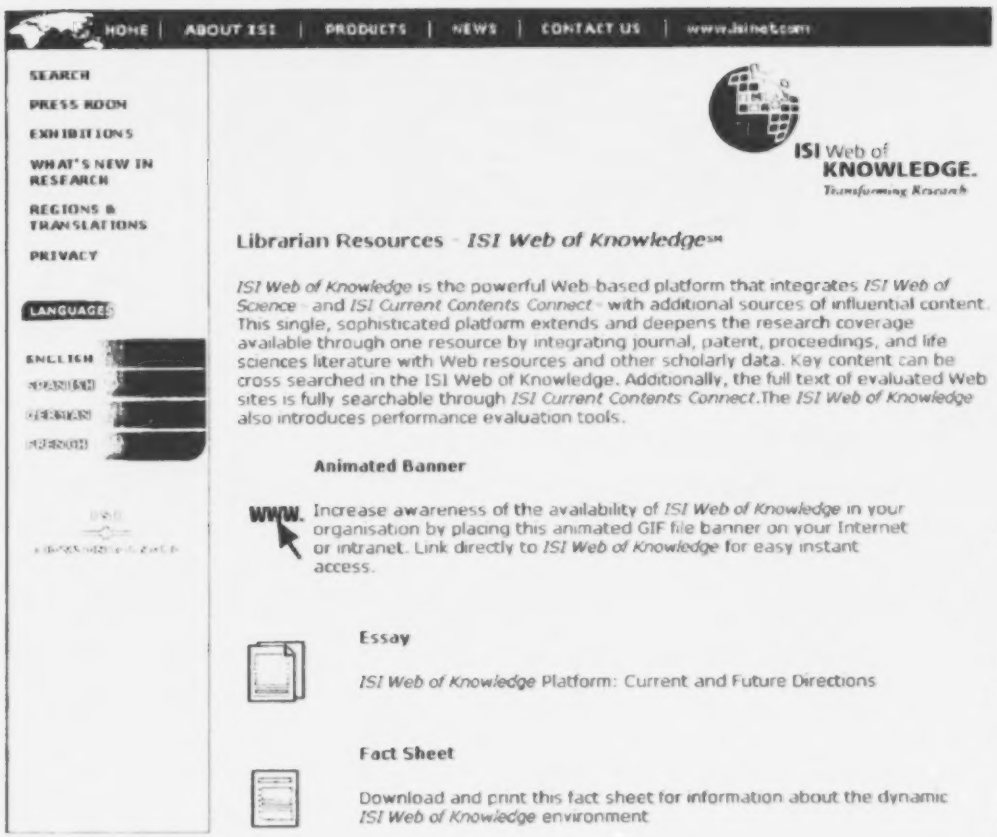
HOME | ABOUT ISI | PRODUCTS | NEWS | CONTACT US | www.isinet.com
SEARCH
PRESS ROOM
EXHIBITIONS
WHAT'S NEW IN RESEARCH
REGIONS & TRANSLATIONS
PRIVACY
LANGUAGES
ENGLISH
ISI Web of KNOWLEDGE.
Transforming Research
Librarian Resources - ISI Web of Knowledge℠
ISI Web of Knowledge is the powerful Web-based platform that integrates ISI Web of Science - and ISI Current Contents Connect - with additional sources of influential content. This single, sophisticated platform extends and deepens the research coverage available through one resource by integrating journal, patent, proceedings, and life sciences literature with Web resources and other scholarly data. Key content can be cross searched in the ISI Web of Knowledge. Additionally, the full text of evaluated Web sites is fully searchable through ISI Current Contents Connect.The ISI Web of Knowledge also introduces performance evaluation tools.
Animated Banner
www.
Increase awareness of the availability of ISI Web of Knowledge in your organisation by placing this animated GIF file banner on your Internet or intranet. Link directly to ISI Web of Knowledge for easy instant access.
32kb
Essay
ISI Web of Knowledge Platform: Current and Future Directions
60kb
Fact Sheet
Download and print this fact sheet for information about the dynamic ISI Web of Knowledge environment
76kb

Figure 4 is the Librarian's *ISI Web of Knowledge*[sm] page. Note that some of this material has been designed so that it can be easily "snatched" and inserted into communications designed on-site by librarians and information specialists. For instance, the logo for *ISI Web of Knowledge*[sm] can be used to add a little interest to an e-mail announcing an upgrade in the product or one pointing out a search tip.

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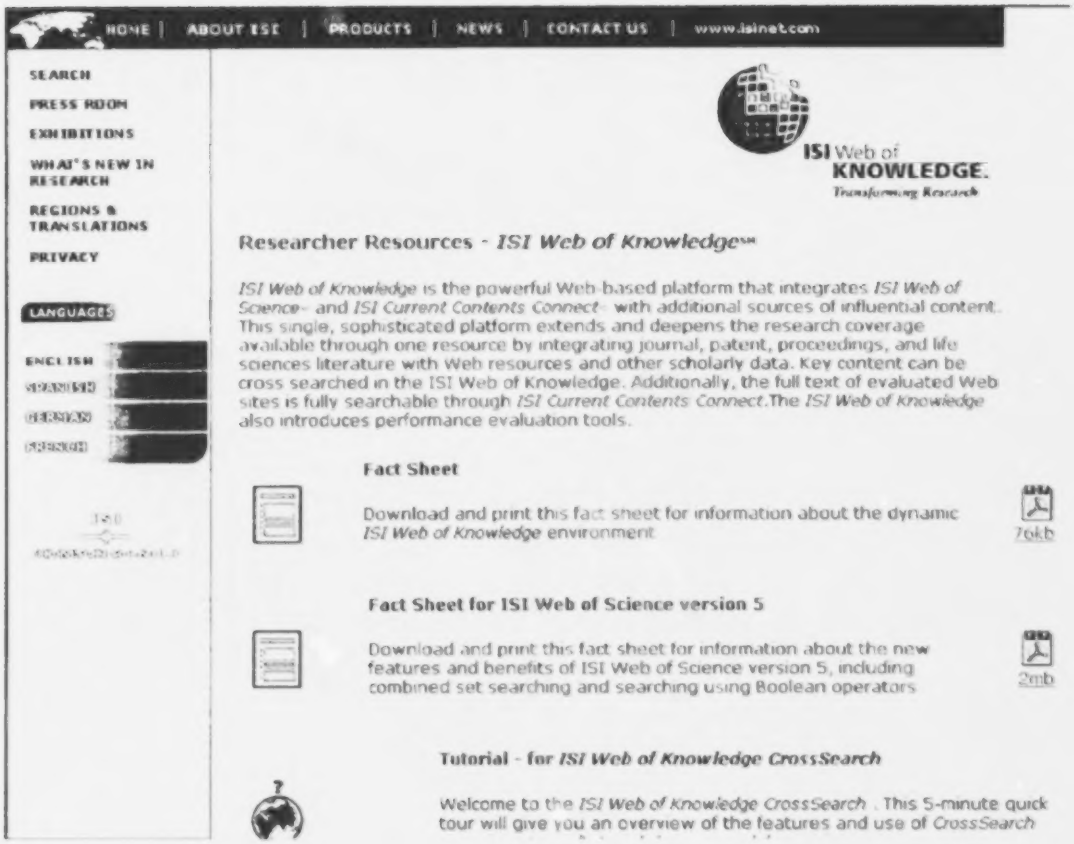
HOME | ABOUT ISI | PRODUCTS | NEWS | CONTACT US | www.isinet.com
SEARCH
PRESS ROOM
EXHIBITIONS
WHAT'S NEW IN RESEARCH
REGIONS & TRANSLATIONS
PRIVACY
LANGUAGES
ENGLISH
ISI Web of KNOWLEDGE.
Researcher Resources - ISI Web of Knowledge℠
ISI Web of Knowledge is the powerful Web-based platform that integrates ISI Web of Science® and ISI Current Contents Connect® with additional sources of influential content. This single, sophisticated platform extends and deepens the research coverage available through one resource by integrating journal, patent, proceedings, and life sciences literature with Web resources and other scholarly data. Key content can be cross searched in the ISI Web of Knowledge. Additionally, the full text of evaluated Web sites is fully searchable through ISI Current Contents Connect.The ISI Web of Knowledge also introduces performance evaluation tools.
Fact Sheet
Download and print this fact sheet for information about the dynamic ISI Web of Knowledge environment
76kb
Fact Sheet for ISI Web of Science version 5
Download and print this fact sheet for information about the new features and benefits of ISI Web of Science version 5, including combined set searching and searching using Boolean operators
2mb
Tutorial - for ISI Web of Knowledge CrossSearch
Welcome to the ISI Web of Knowledge CrossSearch . This 5-minute quick tour will give you an overview of the features and use of CrossSearch

Figure 5 is the users or researchers page. All marketing material has been removed, leaving just educational material. One interesting resource is the tutorial—a short Web instructional tour of the platform. It is simple in design and direct in its presentation.

CONTINUING COLLABORATION AND CUSTOMIZATION

Even though the Electronic Resource Center successfully combines marketing and training materials there is still a need at some institutions for customization. As an example, we are also working with the library community on a major project. They requested, among other things, blanket permission to take materials from the ISI Web site and adapt it for their own local use. One idea that they are implementing is the insertion of various questions for students so those tutorials become a marked exercise. Linda Humpheys from the JIBS User Group, which supports services provided by the JISC in the UK, feels that getting the students to answer questions focuses their attention and encourages them to complete the tutorial and retain more information.

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UNITED STATES CORPORATE MARKETING INITIATIVES

The ISI marketing and sales staff in North America can now make this Web resource available to their customers. To date, corporate marketing efforts in the United States are collaborative. Account Managers work closely with the US-based marketing staff who, in turn, collaborate with the librarian or information specialist at a site to determine their objectives in a pre- or post-sales environment. ISI staff then design customized campaigns to promote awareness and provide training materials as needed. Their objective is to offer a service that guarantees that the librarian or information specialist gets "the most for their money".

In a pre-sales environment, it is important for the librarian to demonstrate that the proposed product will be of interest and value to researchers. In a post-sale environment, strong usage must be demonstrated.

In pre-sales environments, ISI staff has provided e-mail notices with embedded quick reference cards, hosted on-site events and follow-up with electronic flyers. Pre-sale, at a pharmaceutical institution, ISI marketing designed an electronic internal promotion with a PalmPilot as a prize, thus generating awareness and demonstrating value and interest. More recently a worldwide program has been designed that will aid librarians and researchers in an *ISI Web of Knowledge*[sm] trial environment.

Our efforts have been appreciated. Post-sale, at one Fortune 500 company, ISI marketing provided personnel for a training and awareness seminar that was made available internationally via an interactive Web broadcast and recorded for use later. One librarian, who worked with the ISI marketing staff commented: "You take the burden off my staff and myself. You do the work. We reap the benefit. You have helped me publicize your product at no additional cost and allowed me to brand that effort. We need to continue this relationship"

COLLABORATION: GOING FORWARD

Marketing staff in Philadelphia will focus on alerting corporate sites and ARL libraries in the United States and Canada about the availability of this Library Resource Center. North American corporate marketing will continue their efforts and are designing a template that will allow them to track each effort and demonstrate success stories. European marketing staff will continue serving the UK, France, Germany, and Spain. The Latin American staff will focus on customers in Mexico and Brazil.

Baseline studies will be made of the usage of the newly designed Library Resource Center in April and May. Trend reports will then be issued on a monthly basis with analysis provided by market. The reports will include an initial cost analysis of any marketing efforts necessary to "jump start" the Library Resource Center. For example, it is expected that some marketing groups will launch a direct mail effort to alert librarians of the availability of these materials.

COLLABORATIVE ANALYSIS: THE LIBRARY COMMUNITY

To further test reaction to the Library Resource Center, in September, users and librarians will be asked to participate in a Web-based marketing research survey on the ISI Web site. This information will help shape future marketing material that will aid librarians in their efforts to increase awareness of ISI resources. We will need your input. To date, it is the discussions that our staff in the United Kingdom has had with your colleagues that have brought us to this point. Please let's continue a dialogue and continue to work together.

Developing E-Business Information Without a Business School

Hema Ramachandran, MLIS, California Institute of Technology
Louisa Toot, MLIS, California Institute of Technology
Caroline Smith, MLIS, California Institute of Technology

Looking back, it is interesting how a brief, tangential statement made at a June 2000 staff meeting has developed into an exciting new venture for three science and engineering librarians at the California Institute of Technology (Caltech). At that fateful meeting our humanities librarian casually mentioned that she had been in contact with a professor of mechanical engineering who wanted to know the location and breadth of the Caltech Library System's business collection. It seems he was in the process of designing a new course on Internet Business. Given that we are the engineering librarians who support his research and teaching, we wanted to pursue this information with him. We could have chosen to provide him with only basic reference support, but with the blessing of our manager we decided to match the entrepreneurial climate he was fostering on campus with some entrepreneurial ideas of our own.

These efforts of ours have resulted in the development of an extensive website (http://library/learning/bizresources.htm), popular instructional sessions, expanded reference and research services, the addition of more databases, and collection development designed to support not only the Internet Business class, but the other business-related ventures on campus as well. And all of this was accomplished without a business school and its attendant resources, or without any formal training as business librarians.

Campus Climate and Beyond

In the months prior to hearing about the Internet Business course, we had casually observed that there was a definite "buzz" on campus about start-up companies, business plans, and technology transfer. It was fashionable for our graduating students to start their own businesses, or at least to go to work in a start-up shop. Some Caltech students had begun their own companies before even finishing their degrees. The needs of these budding entrepreneurs were already being reflected in the Library's burgeoning instructional program with a successful class on Patent Searching taught by one of our librarians and an attorney from Caltech's Office of Technology Transfer.

This campus-wide interest in business and entrepreneurship had sparked our own fleeting thoughts of offering an instructional session on business resources for engineers, but it was not clear to us how to fit this in to our conventional efforts to assist our disparate engineering groups. But hearing about the developing Internet Business class galvanized our interest and resolve. A quick e-mail from us and an immediate response from Professor Pickar resulted in a meeting to join forces in support of Internet Business at Caltech.

Our initial meeting was in essence a fact-finding mission as well as an opportunity to exchange information. Professor Pickar was in the throes of developing his syllabus for Internet Business, which was to debut fall term. Together we reviewed similar classes developed at MIT, Stanford, and UCLA—all of which are peer institutions of Caltech, and all of which have management/business schools. We were aware of a couple of related classes already offered on our campus, in particular, an ad-hoc course given in the Office of Technology Transfer, and a longstanding offering given by an emeritus faculty member who was filling the void to educate Caltech students on basic business skills and entrepreneurship.

From this initial meeting we also gained some important information about another entrepreneurial and business development on campus. Caltech had joined forces with the Art Center School of Design (Pasadena, CA) to write a proposal to the National Science Foundation to fund Entrepreneurial Post-Graduate Fellowships. This Entrepreneurial Fellowship Program (EFP) would support Caltech and Art Center graduates at all levels (bachelor, master, Ph.D.) and help jumpstart their entrepreneurial activities, effectively shortening the time between concept and actual business enterprise. As stated on the EFP website, "the goal of the EFP is to help entrepreneurs transition from their academic careers into the business world." In a previous version of this fellowship students were awarded funds for promising business plans, but it was soon realized that without extra support and guidance the awardees were not able to get their plans off the ground at a reasonable pace. With funding from the new proposal it was hoped that a yearlong fellowship would prove more beneficial for those involved. The EFP was designed "for students previously trained in science, engineering, or design to adapt their skills to the development of commercial products in a start-up environment." The proposal was successful and the first Entrepreneurial Fellows started the program in July 2001.

The interest and preoccupation with entrepreneurship that pervaded the Caltech campus was in no way unique, rather it was a reflection of the national scene. So in preparation for our work we conducted a brief literature search on the history and current status of entrepreneurship education. The articles we found reflected a wide range of entrepreneurship activities and education on campuses across the United States. American colleges and universities have a surprisingly longer legacy of entrepreneurship education than one would imagine, with the first courses offered forty years ago. Since those days the number of courses has continued to grow at a steady rate.

The majority of entrepreneurial courses offered are aimed at business students, while the concept of entrepreneurship education for engineering students remains not yet fully understood. An article by Standish-Kuon and Rice published this year helps to fill in the gaps and offers some very interesting insights into this particular aspect of the topic of entrepreneurship—the aspect that is of most interest to us and our endeavors at Caltech. This study examines how traditional science and engineering students are being taught entrepreneurship at six American universities. These institutions – Carnegie Mellon, Rensselaer Polytechnic Institute, Stanford University, UCLA, University of Colorado at Boulder, and University of Iowa – were chosen from the ten founding members of the National Consortium of Entrepreneurship Centers. Data was collected over a period of one year using a variety of techniques: site visits, review of internal documents, in-person and telephone interviews, and a follow-up survey. The study concluded that "five categories of actions define entrepreneurship:"

- Developing intellectual content, including scholarly research
- Gaining institutional acceptance
- Engaging students and alumni
- Building relationships with the business community
- Showcasing success

The first category was where we focused our interests and efforts as it is based on the assumption that entrepreneurship can be taught. Standish-Kuon and Rice state that "students can learn to recognize opportunities, to gather and deploy resources, and to create and harvest businesses. Further, entrepreneurship has a legitimate place in academic life as a subject of research." Libraries, librarians, and information resources have a major role to play in the process of learning the art of entrepreneurship and the gathering and deploying of resources, and we intended to do our part in this process.

Road-Mapping a Strategy

With our initial meeting with Professor Pickar and our early research efforts behind us, we began to panic as we realized the immense challenges we were facing! The Caltech Library System had neither a business librarian nor an extensive collection of business and management resources for us to work with. We were going to have to re-tool our professional skills and put together a body of materials that would support entrepreneurial scholarship and action. In order to put our panic at bay we knew that it was imperative that we map out a strategy for our role in this endeavor. Pickar's enthusiasm for our involvement in his Internet Business class was infectious, but it put us in danger of taking on more work than we could handle. We had to politely decline his offer to us to manage the class website and the website for the Caltech Entrepreneurs Club. Instead, we worked with him and offered a critique and suggestions for improving both websites, since this was an area in which we had experience and training.

We drew up a plan of action so that our goals were clear in our minds as to how the Caltech Library System and we would support the new program. We established the following goals:

- Develop and maintain a website of information resources to support reference and instruction in business resources
- Offer instructional sessions on business information—focusing in particular on E-Business and market research
- Survey, evaluate, and recommend new business databases
- Collection analysis

As we turned these preliminary goals into action they developed into three main components for us to work on:

1. An information audit to investigate what resources we had on campus and what we were lacking. We were looking to add items specifically relevant to the Internet Business class and materials that would be suitable for the EFP. This included adding titles recommended by Professor Pickar, and reviewing the book collection assembled for private use in Avery House (an undergraduate through faculty residence hall designed to house inventors and entrepreneurs in a stimulating, communal environment)
2. A website of business resources designed and maintained by the library
3. Instructional sessions on company & industry research, and business & market research

It is important to mention at this juncture that we had undertaken this project in addition to our respective duties as technical reference librarians for engineering and the sciences. Timing is everything, and this project came at a fortunate time for us. It was the beginning of summer, a traditionally slower-paced season on the Caltech campus. Even without a summer schedule full of pressing projects it still required us to spend evenings and weekends immersing ourselves in business research. It is clear now that there was no way that we could have achieved so much without devoting the additional time to this undertaking. Each of us brought different and complementary strengths to our tasks and to our brainstorming sessions. Plus we each supplied healthy doses of moral support.

The Retooling

In order to accomplish all that we intended we needed to do some serious retooling in order to add business librarianship into our skill set. The immediate question became, how do librarians with decades of combined experience in science and technology retool themselves for the ever-changing world of business information in a time period of less than three months?

Though it may sound grueling, retooling ourselves was perhaps the most fun part of this project for us. It was reminiscent of being back in library school as we learned of the information resources we would need, and worrying if we'd remember those resources once we were on the spot at the reference desk.

We started our retooling by asking ourselves who would have this information about how to do business research. It was a deceptively easy question, the answer being of course, business librarians. But since we didn't have access to a business librarian on our campus we turned instead to our trusty online catalog and searched for materials about business research. We managed to find *the* bible on this topic, Lavin's "Business Information: How to Find it, How to Use it," as well as two other texts on business research. Of the three titles the newest was published in 1992 and the oldest in 1975. We felt these provided a good basis for background information and we then turned our attention to materials on the Internet and e-commerce. Though the Internet really began to take off in 1994, and online businesses had heated up the economy over the past few years, we found next to nothing on this topic in our catalog. Still, this gave us a good grounding in the basics of essential business research. Thus our first act as newly attuned business librarians was to order a copy of Bates' "Super Searcher's Do Business."

The next thing we did was scour the web for business schools and business librarians' websites to see what links were included on their pages and which of those would prove useful for our purposes and our goals. Having ready access to so many other librarians' efforts and expertise really paid off for us. On the business school web pages we searched for course syllabi related to engineering and entrepreneurship and e-business to see what texts were being used and what we might want to add to our collection in support of the new Internet Business class. While this work proved fruitful when we could actually access a course syllabus, it is important to note that many course materials are IP or password restricted. Thus we also searched the Scout Report, the Librarian's Index to the Internet, and Yahoo!, among other directories and search engines, in order to find relevant, free, and authoritative resources. We had amassed a great deal of information, we had collected websites and other Internet resources, and what we had to do next was digest it all and turn it into a useful web page and a comprehensible class.

Website Creation

A useful web page meant a custom-made website to support bibliographic instruction and reference work for the forthcoming Internet Business class. Our intention was to create a one-stop shop for the best, most authoritative, mostly free resources available in business research combined with guidance on how to supplement a web search with existing library subscription databases such as First Search, INSPEC, etc. We intended to teach a one time instructional session on how to access business resources online and how to do business research. However, through collecting, evaluating, and learning all of these resources we decided that this website would not only serve the needs of Professor Pickar's E-106 Internet Business class, but it could also serve as a base for our other librarians, and the campus as a whole, to learn about business research.

We designed the site as a Yahoo!-style directory of business resources. To facilitate easy access to information we arranged the collected resources into logical categories. Our first broad category was devoted to resources on e-commerce, as this was the most topically relevant to the E-106 class. From there we prioritized according to relevancy to the class assignments.

Two years later the website has evolved into a jumping off point for all of our campus colleagues who are in need of business information, and not just e-business information. As we continue to widen our content scope to include all of the greater Caltech community, we modify our site and make changes as appropriate. We routinely check links and add new sites. Since its inception the website has changed to reflect resources as they move from free to fee and in and out of existence, and it has evolved into the basis for our instructional sessions.

One of the unique features of our website is our "Jumpstarts," which are in essence pathfinders. This was something that was created to support the Internet Business class, but we have retained them on our business resources website. Our three Jumpstarts cover Company Research, Industry Research, and Research Briefs. They have proven to be a very useful tool as they provide a simple strategy and framework for conducting business research. In the early stages of our work on this project, creating the Jumpstarts helped us to codify and solidify what we had learned. They have become an invaluable aide when it comes to teaching our students to conduct business research. The Jumpstarts are also useful to the independent student who wants to understand the arena of business research, but without the formality of classroom instruction.

Ultimately, designing and creating this website and its content was no small feat. It consumed the better part of our efforts that summer, but its debut that fall term went without any glitches. Professor Pickar and his students used our web site and Jumpstarts as core content for up-to-date information not easily accessible elsewhere.

Classes

Our first instructional session was held on October 5, 2000, just two and a half months after our initial meeting with Professor Pickar. Our website and our class were publicized only to the E-106 class that fall. The website and our names and e-mail addresses were linked from the online class syllabus. Our objectives for that class were to introduce the students to the organization of the website and to demonstrate how one might go about doing company and industry research using the resources assembled on the site. We wanted to show the iterative process of research in general, and of business research in particular. To do this we used one exemple from industry (closed-circuit TV) and one company (Peapod) and worked through the steps outlined in our Jumpstarts.

This supposed one-time class became the first in a continuing series of classes on business resources. After that first class we stepped back and analyzed what we did, what worked well, and what didn't. With each successive class we offer, we modify our presentation to fit the audience and tailor the scope of the class. In 2001 we taught five sessions on business resources for the general campus community. For one of these sessions we focused on market research as the theme. That we then turned into an invited session for a class where the students learned to write a business plan based on the information we shared with them. Another class we taught focused specifically on searching Nexis/Lexis Academic Universe for business and related information. Classes on business resources are now regular fixtures on the roster of instructional sessions offered by Caltech librarians. We have been invited to speak at a growing number of classes by request of our faculty.

Conclusions

This project has increased our visibility on campus, both for the Caltech Library System as an organization, and for us as individuals serving as information specialists. Segments of our campus that were not aware of us before, have become regular users of the library and have been publicizing our services to their colleagues. As the popularity and options increase for our business resource classes we have recruited our fellow campus librarians to join in our work. Our initial development efforts have resulted in a web resource that easily acquaints our colleagues with this material and trains them effectively enough so that they too can teach business resource classes. We now have an enthusiastic group of "next generation" Caltech science and engineering librarians who can bring business resources to our campus population, without the presence of a business school.

This case study of how we put our knowledge to work presents a strategic approach that can be applied in most organizations. Our work is increasingly interdisciplinary here at Caltech, and we believe that is a reflection of the national trend. The role of academic librarians is constantly shifting and changing, but this can create positive and unexpected results that lead to new ventures and enhanced visibility on campus.

References

Standish-Kuon, Terri and Rice, Mark P., "Introducing Engineering and Science Students to Entrepreneurship: Models and Influentional Factors at Six American Universities," *Journal of Engineering Education*, 91 (1), January 2002, pp. 33-39.

Do Librarians Really Do That?
Or Providing Custom, Fee-Based Services

Susan Whitmore, Chief, Information & Education Services Section, and Janet Heekin, Librarian, National Institutes of Health Library, Bethesda, MD 20892

Increasingly, librarians are called upon to provide services such as web page development and knowledge management that are outside traditional library services and we must work to define these services, develop expertise in their delivery and market these services to users.

The National Institutes of Health (NIH) Library provides fee-based, custom services to the NIH staff in addition to the more traditional library services of the print and electronic collections, document delivery, information services, and instruction. While some of the custom services are outside the traditional library services, they do involve providing information or information management, and, in many cases, utilize skills already inherent in the staff such as database searching and development, reference service, web page design and development, and journal management.

The custom services that we offer currently include knowledge management, clinical liaisons, specialized database searching, bibliographic database development, web resource guide development, and journal management services (see the Custom Service Portfolio sidebar found below.)

SELECTING THE SERVICES

The decision to choose these particular services as custom services was based on several factors including customer requests and survey results.

Over the past few years we have had a number of customers who have asked for services that were extensions of basic services but were somewhat out of scope of what we were currently providing. We tried to accommodate these requests but were always concerned about the uneven allocation of resources to NIH staff. Out of a concern about depleting our resources, we placed some limits on what we could provide. We wanted to provide these services, but needed a mechanism with which to do this. In 2001, a new cost recovery business model, based on demand for service, replaced the previous incremental base budget model, and this new model provided us with the needed mechanism.

To gain a better understanding of the types of specialized services NIH groups or individual researchers might want us to provide, we conducted a telephone survey of 400 randomly selected NIH Library users in 2000 and included questions about potential custom services. As part of this survey we asked our customers if they would find it beneficial to have a librarian who could develop a bibliographic database or a web resource page. The results were favorable. To the question of "how beneficial to you would it be to have a librarian design and construct a customized web page tailored to your specific research" the responses were 45.5%

very beneficial, 30.8% somewhat beneficial, 11.8% not too beneficial, 20.8% not at all beneficial, and 1.2% no response. To the question of "how beneficial to you would it be to have a librarian design and develop a database organizing collections of articles documents or other items for easy retrieval" the responses were 49.8% very beneficial, 29.5% somewhat beneficial, 7.2% not too beneficial, 12.8% not at all beneficial, and 0.8% no response. With over 40% of the interviewees responding that the service would be very beneficial, we felt there would be a sizable group who would be interested in these services, and, therefore, decided to provide them.

During the past two years we have been cautious in the promotion of custom services among NIH staff. While we have many mechanisms to use to advertise our services, including a web site, listservs, newsletters, and an electronic bulletin board, we are not staffed to be able to provide a large number of these services all at once, and instead are concentrating on building our reputation and the number of custom service projects we undertake over time.

CUSTOM SERVICE COMPETENCIES

In many cases, the skills needed to provide custom services are traditional library skills of identifying, organizing, managing, and training others to use information. Specifically, most of our custom services use the more traditional reference, database searching, instruction, journal ordering and management, use of bibliographic database management software, and thesaurus development skills as well as newer skills such as design and construction of web pages, usability testing, and knowledge management.

A number of these skills are specifically mentioned in the Special Libraries Association "Competencies for Special Librarians" [5]. In particular the personal competencies of "seeks out challenges and sees new opportunities both inside and outside the library," "sees the big picture," "has personal business skills and creates new opportunities, and "is flexible and positive in a time of continuing change" are particularly important in the ability to analyze customer's requests for service and envision how the library can provide that service.

In addition, the competency of "is committed to lifelong learning and personal career planning" is essential to the willingness to build upon current skills or apply current skills in entirely new settings or in new arenas.

EXAMPLES OF CUSTOM SERVICE PROJECTS

During 2001 we completed eleven custom service projects and our goal is to complete 30 such projects a year by 2003. Following are three examples of custom service projects.

The Office of Medical Applications of Research (OMAR) asked us to search for references to the consensus development reports that they produce as these reports are often republished in journals, and to see how often the reports are cited in the literature. Given the number of reports that have been published and the difficulty in cited reference searching for this type of publication, this was a fairly extensive project. The results of the project have been included on the OMAR web site (http://odp.od.nih.gov/consensus/) on individual consensus statement pages as the "List of Publications Related to this Consensus Conference".

The National Institute for Allergy and Infectious Diseases (NIAID) asked us to search for web sites that would be of use to their extramural grants staff and place bookmarks or favorites on the computer in their off-campus journal reading room. Instead, we proposed developing a web page that would serve as a focal point for access to frequently used research tools, including genome databases and online journals, as well as Internet sites with breaking news, listservs and statistical resources relevant to the work of NIAID researchers. We felt this web page would be more useful to them as it could be used by all staff from their desktop computers and would be easy for us to keep up-to-date remotely. You can view this customized web site at http://nihlibrary.nih.gov/niaid/niaid.html. We add new information monthly to these pages.

The Office of Research Services (ORS), of which the NIH Library is a part, asked us to undertake a knowledge management project that would help them organize and disseminate information relevant to ORS management operations. We are currently working with their staff to design and develop an Information Management System that will provide a mechanism whereby the ORS management staff may effectively store and organize information that comes into the Deputy Director's office from the various ORS offices and divisions, as well as enable effective dissemination of information to its offices and divisions. This project includes conducting an information audit, developing a prototype web-based Information Management System, and conducting usability tests.

FUTURE DIRECTIONS

Currently, we are working to pursue activities in the areas of developing additional custom services, developing skills among staff that can facilitate the provision of custom services, and marketing these services more heavily to NIH staff.

First, we plan to further identify custom service needs within our customer base and initiate consulting opportunities where appropriate. Currently we are working with NIH clinical staff to expand the role of clinical liaisons to informationists [1-4] who will work collaboratively as an integral part of both research and clinical care teams at NIH providing specialized expertise in information management that contributes to research and clinical situations.

Second, we plan to continue developing new skills related to the provision of information particularly in the areas of knowledge management, usability testing, and the new role of the informationist. Informationists need strong skills in not only information services, but also biomedicine, bioinformatics, and biostatistics. We are developing a training program to ensure that they possess the appropriate skills.

Lastly, we will continue to develop marketing strategies in order to promote these new and innovative services to specific target groups within the NIH community, as well as perform continuous evaluation of these services to ensure that we are providing quality, professional services that satisfy our customers' needs.

CONCLUSION

By providing personalized information services in response to our customers' needs, we have been able to recognize and initiate consultation opportunities and provide creative and innovative solutions to groups that we may not have otherwise served.

As one of the strategic goals of the Library is to provide "customized information services and transparent access to the most relevant information for its users", we believe we have not only succeeded in fulfilling this goal, but have also raised the visibility of the Library and the kinds of professional information services we can provide to our customers. In particular, we have raised awareness that librarians act as information consultants to NIH groups and collaborate on special projects that require a high degree of professional information skills. We feel this also contributes to a positive image for the Library's provision of basic services as well.

Finally, in addition to the benefits that can be seen for our customers in terms of receiving quality custom services, we are also able to see tangible benefits for the staff of the Library as well. Through the provision of personalized information services, librarians have been able to explore creative and innovative methods and technologies and develop new roles they may not have otherwise developed. We believe these new roles ultimately promote a greater sense of professionalism and job satisfaction among the professional library staff.

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CUSTOM SERVICE PORTFOLIO

Knowledge Management Services - Professional analysis, identification, and organization of knowledge assets to enhance achievement of organizational objectives

NIH Librarians currently provide knowledge management services to NIH researchers by working closely with a work group to help identify and manage its knowledge base in order to advance the collective knowledge of its staff with the goal of enhancing the research efforts of NIH scientists. Librarians give assistance with designing organizing and developing web-based information management systems that serve as a repository for the work group's communications, documents and links to relevant web resources. Librarians specifically conduct information audits, develop taxonomies, design site architectures, develop prototypes and conduct usability tests as part of delivering knowledge management services.

Clinical Liaison Services - dedicated professional searching, value-added information delivery, and training services for NIH patient-care teams

The NIH Library maintains an active program of Clinical Liaison Services to the clinical units within the NIH Magnuson Clinical Center and associated labs. As a part of this service, clinical librarians attend clinical rounds and participate as members of a unit's patient care team by performing literature searches on topics relevant to patient care issues and/or clinical research programs. Utilizing quality-filtering techniques, clinical liaisons are able to retrieve highly relevant and authoritative information, thus saving the clinician countless hours of perusing the literature, and allowing the clinician more time to devote to his/her clinical practice or research activities. By participating as a member of a unit's patient care team, attending staff meetings, and/or attending journal club meetings, the clinical liaison is uniquely qualified and available to understand and meet the unit's information needs. The liaison also provides specialized training that is tailored to the interests of each group.

Specialized Database Searching Services - extensive database searching and consultation for special projects

NIH librarians work directly with NIH researchers by providing consultation on choosing appropriate database resources, developing search strategies, as well as providing in-depth, quality-filtered search results. Librarians download search results into databases using a reference management package such as EndNote and Reference Manager. These reference databases can be shared by your department - eliminating redundant resources that may be scattered throughout a department - saving the work group time and money. As a part of this service, librarians also offer training on how to use reference management software.

Bibliographic Database Development - customized databases that organize article, document, and other collections for easy retrieval

NIH Librarians provide consultation in designing and developing databases that organize collections of articles, documents or other items for easy retrieval. Librarians also conduct literature searches, filter search results and download citations into a bibliographic management package such as EndNote, Reference Manager or Procite.

Web Resource Guides Development - provides access to professionally evaluated and organized web-based research tools and resources

This service specializes in the design of web guides that provide access to web-based research tools and resources that are evaluated and indexed by NIH librarians to specifically meet the information research needs of your group. A customized web site can enhance your group's access to information by serving as a one-stop solution for your unique information needs.

Journal Management Services - simplified journal ordering and tracking that maximizes staff's efforts and minimizes their learning curve

The NIH Library offers comprehensive services designed to reduce the cost of maintaining journal collections for individual NIH offices or departments who may be seeking an alternative in in-house management of its collections. These services include simplified journal ordering services using the NIH Library's current contract with a commercial subscription service. Other collection management services include using its journal tracking system to order, receive, and claim journal issues for you. Journal records are created in the NIH Library Online Catalog and are displayed separately in order to make it easier to check on the arrival status of specific issues. A messenger service provides delivery of subscription journals.

In addition to journal ordering and tracking services, the Library also provides binding services, including the preparation of issues for shipment and processing the returned shipment of bound volumes from the commercial binder, as well as library technician services to deliver document delivery items and maintain the journal collection.

Homing in on our Customers: How the Praxair Information Resource Center Reevaluated and Implemented a New Marketing Strategy

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ABSTRACT

Work request statistics have been tracked at the Praxair Information Resource Center (IRC) for nearly a decade. After a gradual and steady increase of work requests over the years, the work requested of the IRC reached a plateau in 1999 that lasted approximately one year. Work request statistics during the winter of 2000, however, indicated a shift away from the utilization of the IRC. Concerned about this change, the IRC set out to evaluate the situation. Results from a survey of customer information habits, as well as focus group meetings, provided the IRC with important information that pointed to several possible reasons for the change in usage. The IRC chose to embrace these findings, and shifted gears slightly, in order to be in closer alignment with the true information needs of the sci-tech patrons. Marketing the right services to the right people in a way that would reach them and be of value to them became essential.

The IRC began a long-term marketing campaign, using both new tactics and honing the tried and true methods. The basic premise of the new marketing techniques revolved around a combination of a significant increase in IRC departmental visibility and more individual, personalized communication. Monthly events sponsored by the department, new IRC "ads", and a more proactive approach were all part of the new marketing strategy.

In July of 2001, the IRC began the new marketing campaign. Statistics continue to be monitored and a follow-up survey will be administered during the first quarter of 2002. Results of the campaign will be evaluated in the Spring of 2002.

BACKGROUND

With annual sales of $5.1 billion, Praxair, Inc. (NYSE:PX) is a global, Fortune 500, company that supplies atmospheric, process and specialty gases, high-performance coatings, and

related services and technologies. The company also designs, engineers and constructs cryogenic and non-cryogenic supply systems.

Prior to 1996, the Praxair library was primarily a function supported by and devoted to the organization's Research and Development department. The year 1996 brought many changes, including placing the library function under Praxair's General Services department with an expanded corporate-wide customer base. Hence, the Praxair Information Resource Center (IRC) was born. From 1996 through 1998, IRC services expanded, marketing to different business units took place, and the IRC staff grew to meet the needs of the expanded user base. The Praxair IRC currently has libraries at two facilities in the US and serves approximately 1000 internal customers, with a potential customer base of 23,300 employees worldwide.

Statistics over the years have shown a steady increase of both library usage and work requests. Most notable was an increase early in 1999, with the integration of a previously separate library into the IRC. For approximately the next 18 months, the IRC experienced a relatively stable number of work requests. In the Fall of 2000, a few months of slightly lower user statistics were followed by a lower-than-usual December. In early 2001 usage statistics were still somewhat lower than usual. This prompted interest in determining why this change in usage might have occurred.

INVESTIGATION

In early Spring 2001 the IRC began an assessment to determine what may have happened. This included the distribution of surveys to both users and non-users; a more in-depth review of IRC usage patterns; meetings with focus groups; and a review of company activities that could be affecting IRC usage. This review uncovered several interesting pieces of information that revealed why the customer usage pattern had changed.

Surveys were distributed to employees who may or may not have been IRC users. A fabulous survey return rate of 90% was attributed to the fact that the IRC tied completion of a survey to receiving a giveaway item. Survey questions were targeted to the information habits of the employees, with questions such as, "Do you prefer doing information searching yourself or having someone searching for you?" and, "What types of information do you use?". A fill-in-the-blank question asking, "What information sources are you using and how is it delivered?" was also provided. The responses to this question were most insightful. This survey pointed to two key pieces of information. First, 75% of the respondents prefer to search themselves, and more than 50% of respondents use the Internet as their primary source of information.

Further analysis of IRC user statistics showed that roughly 80% of our work requests by 1999 - 2000 were generated from R&D departments, while only about 60% were from R&D during the Fall of 2000 and into Spring 2001. This indicated that a change in usage occurred directly related to R&D.

A focus group meeting with several R&D employees who regularly use the IRC also brought to the forefront the need to have more individual contact. The group expressed their frustrations in not knowing all the IRC resources and services available, and feeling distant from

the hub of the IRC. It was clear that we had not nurtured the R&D portion of our customer base over the past few years.

Starting in December 2000, Praxair allowed open Internet access at the desktop level, which made an impact on the IRC services. Previous to the open access policy, the company allowed only a small percentage of employees to have desktop access to the Internet. To help employees without access, the IRC provided computers with Internet access within the IRC libraries for the employees to use. While the IRC had always been pro-access for all employees, this change has had a substantial effect on the IRC usage. Not only did the IRC lose those frequent users of the Internet terminals, but now all employees had the Internet at their disposal 24/7. While we all know the Internet is extremely limited in its information and searching capabilities, many non-information professionals believe that all information can be found there.

In this review, we also took into consideration the fact that we had recently made access to our electronic journals available to our R&D groups. One of our information specialists had created an easy-to-use spreadsheet with a list of the links to the electronic journals to which we subscribe. A simple tool such as this clearly could impact our document acquisition workload.

Other factors beyond the control of the IRC during the course of 2001 also played a part in its usage. For example, one of Praxair's large R&D locations announced in the Spring of 2001 it would close at the end of that year. Several of the IRC's customers were affected by this action, either relocating or leaving the company altogether. In addition, Praxair had roughly a 4% layoff in the Fall of 2001, whereby many of the IRC's regular customers from departments across the board were dismissed.

FINDINGS

The above exercises identified several areas where the IRC could better support customers, particularly the R&D customers. We grouped these findings into two categories: those the IRC can change and those that are beyond our control, but that the IRC needs to adapt to as they arise (such as layoffs, facility closures, etc.).

The IRC staff has a wide and varied skill set to use to assist Praxair employees. While we tend to think of an information center's primary role as finding and providing information, equally important, and to some extent even more important in the view some of our customers, is providing access and guidance for information retrieval. This rang clear and true from the results of the surveys and focus groups, especially from those working in the technical areas who are "pre-wired" for research. In other words, many of the Praxair R&D staff have an inner drive to dig deep for answers, which is a major reason why they want to use desktop tools themselves, as opposed to asking for searches done by the IRC.

ACTION PLAN

Areas that the IRC could address immediately included: providing better communication about the IRC's capabilities, including more personalized communication; supplying useful desktop searching tools; offering information and training for Internet use.

The staff of the IRC worked together to generate ideas for addressing these issues. The basic premise of the plan was to have more frequent contact with our customers and position the IRC as a proactive group with expertise and leadership in information work. To address these issues in a coordinated fashion, the IRC revised existing marketing tools and implemented new marketing and communication tools. These were designed to provide the IRC with feedback to help us stay on track in meeting the customer's needs.

Existing Marketing Tools

The existing IRC brochure was in hardcopy and distributed in new hire orientation packets and at new hire orientation sessions. An electronic brochure was created with easy links to Lotus Notes databases and other electronic IRC resources. This enabled the IRC to get the word out to a much broader audience, and it was easier to control revisions. This new format brochure was also edited to emphasize the capabilities the IRC offers that better reflect the needs of the customers. This brochure was distributed in mass e-mailings and was also used as a guide for orientation sessions.

Previously, the IRC held new hire orientation sessions quarterly at one facility and on an as-needed basis at the other. Orientation sessions are now scheduled monthly at both facilities, and are announced in such a way as to encourage all employees to attend, not just new employees, as past notifications may have implied. In addition, the IRC proactively contacted small groups and departments and presented customized orientations sessions focused on the specific information needs of each group. These had been well received.

Surveys were revised and distributed more frequently. In addition, they were mailed directly from the IRC manager as opposed to being sent from the generic IRC mailbox. We experienced a significant increase in the response rate when the surveys were sent from an identified individual. We are careful not to send surveys to the same person more than once per year.

New Marketing Tools

The IRC staff spent time brainstorming to create a motto that describes the IRC's role. While we spent hours debating, refining, and wordsmithing, the exercise turned out to be extremely beneficial for our group, as we all came away from the sessions with a better understanding of who we are, what we do, and how we bring value to the corporation. Our motto, "The IRC: Praxair's Source for Information" is now included on all documents we generate for our customers. It is our hope that the motto will help our customers understand us better as well.

The IRC created new "advertisements" which were inserted into the bottom of each e-mail sent out to our customers. We changed the ad every two weeks. Examples of ads include, "Did you know the IRC produces two Newsletters? Cybrarian's Newsletter and the IRC News can be viewed in the Lotus Notes database called IRC Newsletters." Another example is: " The IRC maintains a Notes database called Process Improvement Tool Library. It contains hundreds

of valuable tools which can be useful to you, your work group or team projects." We continue to run these little ads so as to remind our customers of the services we provide, as well as use this communication tool as a way to introduce services that employees may not be aware of.

In response to the desire for more end-user searching from the R&D groups, the IRC hosted a Dialog Vendor Day in July of 2001. Advertised to all business units at one of our facilities, this event was extremely well attended due in part, no doubt, by the drawing held for a PDA. Not surprisingly, the majority of attendees and those who eventually signed up for a DialogSelect password were from the R&D groups. Training, both on-site and via telephone had been conducted, and product updates were also provided to those who have IDs. We subsequently and successfully rolled out the Dialog Company Profiles product to some of Praxair's other business units. We organized another vendor day at second Praxair location in March 2002.

As part of the IRC's plan to "get the word out" and to address the issue of the Internet being used as a primary source for information, the IRC began a Fall Series Internet lunch & learn program in August 2001. They are informal and held at a time that is convenient for most people. The IRC had taken the lead to become the local authority on using the Internet. Topics ranged from using search engines to discovering the hidden web, to evaluating sites and information on the web. These had been well received, and one session was actually repeated as there was so much interest .We decided to continue on with a Winter Series. Other employees with Internet experience volunteered to make future presentations as well, and we decided to continue these on a monthly basis indefinitely. The IRC also makes use of these sessions by asking attendees to complete surveys and to provide us with Internet topics they would like to see presented in the future.

Annually the IRC weeds the library collections and offers the discarded library materials to employees. Unlike other years when these materials were left on the book trucks for general perusal, the IRC held a Book Giveaway this year. A large conference room was reserved and the materials were organized attractively. Turn out was great, many books were taken, and this simple activity helped to project a friendly face on the IRC.

The IRC site on Praxair's Intranet was launched in March 2002 and was the fruition of nearly 12 months of interdepartmental work. The IRC had carefully organized our resources and services in an easy-to-use format for the web, which was our next step in bringing the IRC closer to our customer base. The IRC on the Intranet contains a complete directory of all the IRC resources and services at one single location on the Intranet. We anticipate this will greatly further our ability to "get the word out" about the IRC.

RESULTS

Results of these efforts have been wonderful, but far from expected! Initially, we had thought that by promoting the IRC in these ways that usage statistics would increase significantly. Instead of seeing a change in numbers of work requests, we experienced increased visibility, respect and a shift in the services that we provided. The IRC is as busy as ever, but the type of work we do now is less related to answering specific information questions, as in the

past, but now is more focused on serving different needs of the customers. We are educating the customers in using the desktop tools and making sure they know when to ask for assistance from the IRC, which greatly helps the customers help themselves. Unlike typical work requests, many of these services and the value they provide are not quantifiable.

CONCLUSION

It has been approximately one year since we began this exercise, but it is far from over. Marketing our services to the R&D segment of our customer base, as well as the total customer base, needs constant reassessment. Marketing efforts must be based on providing the services that are needed, which can only be accomplished by keeping in sync with the customers changing needs. We also acknowledge the potential impact of the changes that inevitably occur, such as layoffs, mergers, and other unexpected company-wide events. The IRC will continue to evaluate the marketing tools that are in place, as well as consider using others. Our department now has a renewed vigor, now that we have increased our value as "Praxair's Source for Information".

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Leveraging Knowledge: Impact on Low Cost Planetary Mission Design

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INTRODUCTION

In January 1991, Dr Edward Stone became director of the Jet Propulsion Laboratory and undertook the transformation of planetary mission design from large, complex and expensive missions to low-cost planetary missions. The Jet Propulsion Laboratory Technical Library has been involved in a transformation of its own responding to the challenges of a changing environment. This paper discusses innovations developed by the JPL Librarians to reduce the information query cycle time for teams planning low-cost, planetary missions. The information query cycle time was reduced through changing the process of the query and the tools by which information is acquired

BACKGROUND

The Laboratory

When Dr. Edward Stone became Director of JPL, NASA was trying to recover from "serious and embarrassing problems with the space shuttle and the space telescope."[1] The White House and the NASA Administrator, Admiral Richard Truly, disagreed on the approach to space exploration. The White House wanted Admiral Truly to "scale back plans for large, expensive, and long duration space science programs."[2]

By March 1992, Admiral Richard Truly had been replaced by Daniel S. Golden who had many years of experience at TRW managing industrial space company. One of his first acts was to visit all the NASA Centers. At JPL "he declared that he wanted to see smaller space projects that could be launched quicker and cheaper."[3] Beginning in 1992, JPL senior management began significant changes: reduction of the work force; descoping the complex Cassini project to save time and money; and designing an innovative Mars Program comprised of smaller, less complex projects.[4]

The change in mission design necessitated changing the way technology was developed at JPL to meet mission requirements. The large projects of the past had had the time and resources to develop the new technology needed during the course of the mission. The new strategy was to develop organizational structures to "advance their [technology] capabilities in chosen areas and integrate those capabilities into the flight projects."[5] For example, the X-2000 program provided "technology development in avionics, communications, and power systems."[6]

The Library

The JPL Technical Library went through a serious review in 1993, both from within and a peer review from colleagues at Caltech. The Library had a Marketing Committee who decided to conduct an extensive survey of our customers as a "first step toward developing a long-term marketing plan for the Library."[7] The survey asked a variety of questions about the collections and the services. The survey packet also had free-text comment areas. The Marketing Committee made ten recommendations in its report. The clearest statements were to "improve customer access to online databases;... reduce the turnaround time for book, document and serial orders;...develop customer outreach and education programs"...[8]

We also had a peer review in 1993 by a colleague at Caltech that was commissioned by the Science Division at JPL. In certain areas there was a confluence of thought: the Library needed to "provide users with direct electronic access to databases with document delivery capability"; and [9] "purchase the electronic version of information resources...;" [10] Evaluation of the changing JPL environment, the Library customer survey results, and the Caltech study led to the evolution of our Virtual Information Environment known as BEACON, extensive participation in Knowledge Management Projects; and consulting with the Flight Systems Engineering Section.

VIRTUAL INFORMATION ENVIRONMENT

The JPL changed environment meant that we had to develop an improved process and new tools to shorten the time for acquiring information. We decided to focus on online tools in the users' workspace for self-service inquiry.

The development strategies included a continuous improvement of the online environment. From 1993 to 2002 we have addressed and continue to address the issues of access, content and online requests.

We began with global access to content through local Internet Service Providers and JPLNet, the remote access service at JPL. JPL has improved remote access since our initial rollout by implementing a Virtual Private Network (VPN) technology, which has dramatically increased the speed of remote access but necessitated ongoing negotiations with the publishers to enter their IP addresses into the VPN "tunnel."

The content was selected for ease of use, technical quality, reliability, relevance and query cycle time. Organizing and presenting the large number of full-text journals and books has brought us more deeply into the world of information architecture. We began with a manageable list of 300 full-text journals, but now have over 800 titles. To increase the "findability" of titles by subject and title, we have entered titles into the catalog and added subject pages for online resources to the web site. Working on ease-of-use issues and reducing the query cycle issue caused us to spend considerable time on navigation, labeling, site indexes and maps to the BEACON web site.

Online requests for titles not linked to full-text files has been critical to improving our turnaround time. We have refined our processes for filling requests and worked on the technical issues of the online request mechanism. We discovered just how many different platforms and browsers are being used when we implemented online request forms. We resolved problems for the most commonly used platforms and browsers, but also established an email address dedicated to online requests.

The BEACON web site and full-text journals and books have been well received, but most of the content was formal publications rather than unpublished and often ephemeral information created within JPL which was quite often the missing piece needed by the engineer or scientist.

KNOWLEDGE MANAGEMENT PROJECTS

Internal information, both tacit and explicit, has always been the most elusive information to try to provide the customer. Developing innovative tools and processes to shorten the cycle of getting information has been a challenge. JPL had repositories for documents, technical drawings and product data, but retrieval was difficult without the numbers assigned to the item. The JPL Technical Library had been allocating staff resources for twenty years to index documents placed in the central file and identified only by a document number. These documents were microfilmed and available to the Laboratory. However, the repository was not part of the Library and the indexing was extremely labor intensive. The activity and the database was eventually turned over to the Engineering Document Group who managed the repository

As demand for collaborative work space and access to shared electronic information grew, numerous electronic project repositories were created. The repositories were home grown and not standardized. It was difficult to discover their existence, much less what was in them.

Finding a solution to the electronic repositories documentation requirements of the increasing number of projects was one of the main business drivers for knowledge management at JPL. The Knowledge Management Program at JPL was centered in the Information Technology Sections. The JPL Librarians library became involved in several of the official Knowledge Management Projects as well as initiating activities later recognized as knowledge management. We needed tools to access the content and networks of people who could connect us with the information we needed in a timely fashion. Following is a brief description of our activities:

Information Providers Directory: The Information Provider Directory was compiled by Teresa Bailey, one of the Technical Librarians, to help audit the available information on the Laboratory, provide contact information and a brief description of the content of each repository. The initial effort developed into a loosely affiliated group that meets quarterly to network and make presentations. Last year the Library organized an Information Provider Fair in the lobby of the Library. We are fortunate to have a large open space where we can have activities. Each participant had a poster or an online demonstration of some product. The Information Providers Directory has become an extremely effective tool for the librarians to get access to obscure collections and for us to provide leadership in developing a community of interest.

JPL Know Who: JPL Know Who is a directory of skills and knowledge at JPL. I became Co-Team lead with someone from the Chief Scientist's office. The project was funded by Knowledge Management and was the first in which a Librarian was a recognized Team Lead. This product will be used as a directory by the Reference staff and a networking tool. Participating in an IT development project with requirements reviews and readiness reviews was useful to gain credibility in the community. It will also be a tool for the Librarians to network with technical experts willing to share their skills and knowledge.

JPL Taxonomy for the Portal: The JPL Portal project was conceptualized by the Knowledge Management Program as a replacement for the JPL Intranet web site. A key feature of the Portal was a taxonomy. Robert Powers, a JPL Librarian, led the taxonomy development effort. The Portal is being rolled out to the Laboratory in phases and is not yet in full use.

Process owner for "Develop Knowledge": The Library Group Supervisor, Barbara Amago, is process owner for "Develop Knowledge" under the Knowledge Management Process Domain, which has been important as a structural element as JPL tries to reshape itself as a process-based organization.

JPL Stories series: The JPL Stories Series is a monthly story-telling event that was organized by a Technical Librarian, Teresa Bailey. Teresa has been able to communicate to the storytellers that the goal is not just colorful yarns. For example, one of the storytellers was able to bring the JPL Design Principles to life by telling stories to illustrate such things as "test as you fly and fly as you test."

Knowledge Capture—Teresa has also been working on several small projects under this general project title to capture and communicate tacit knowledge. Among the activities of the Knowledge Capture Team are interviews of significant retiring JPL senior staff; an underground orientation (what goes on in what buildings); JPL 101 a series of questions about JPL designed to help new hires understand the culture and unpublished information about JPL.

Metadata Standards—I also contributed information on the Dublin Core Standard and its evolution as a standard accepted by JPL

Catalog of JPL Authors and Publications. The Library Supervisor, Barbara Amago, has chaired a team to create a bibliographic database of JPL Authored Publications. It will be used for bibliometric data, specialized bibliographies, and links to full text when possible.

Document Information Management System (DIMS): In this case the Library contributed its bibliographic database of JPL documents to one of the largest repositories which formerly only had access by document number. The collection was mostly on microform. This collaboration enabled location of some of the older documents by author, title, keywords as well as report numbers. This is becoming an increasingly valuable collaboration because the documents are beings scanned and digitized as they are requested which speeds the cycle time.

FLIGHT SYSTEMS ENGINEERING SECTION

The relationship between the JPL Technical Library and the Flight Systems Engineering Section began in August 2000 when Rob Kocsis, a senior member of the Technical Staff in the Flight Systems Engineering Section approached the Library for a consultant to help establish a digital collection for young engineers, new to JPL. JPL had decided that the Xerox product, Docushare, would be used for the project digital collections. The Docushare system itself was managed as a project in the Knowledge Management Program. It provided an infrastructure for digital document repositories for the numerous flight projects and sections.

The Flight Systems Engineering Section leads and supports the spacecraft systems design at JPL. This includes the subsystems (e.g. thermal, power) functional requirements definitions and the interface designs between the different subsystems. They also become involved in launch vehicle integration and spacecraft design verification requirements. [11] Management of these activities subcontracted out to industry has become an increasing part of the job.

The newly hired engineers find themselves quickly assigned to a project and expected to produce deliverables in a relatively short period of time. To complicate matters, they might be co-located in different buildings with other Project Team members or working in a virtual team Environment with partners from industry or universities.

The management of the Section was responding to the cultural and paradigm shift mentioned by Philip Barnett in his thesis. Prior to the 'better-faster-cheaper' era, "performance was the independent variable and cost the dependent variable."[12] Having cost become paramount over performance to the degree that a cost overrun of 25% would mean cancellation of the project meant that senior management had to find means to control costs and mitigate risk. This was the business driver for management to ask the library for help in developing innovative approaches because "project system designs had to be tailored to ensure development times reduced from five to six years or more down to three to four years."[13]

When Rob Kocsis approached the Library, he was uncertain about both the content and the organization of the digital collection. I was the Librarian who became the consultant. We began with a meeting of two senior engineers; four engineers young enough to remember the challenges of being a "newbie" but experienced enough to have discovered solutions to some of the problems; two engineering students from Cal Poly and two new engineers who were to be able to use the team to get answers in real time.

We developed a questionnaire that was sent to all systems engineers in the section. Some of our questions were similar to those used in Wilda Newman's study at APL.[14] Her questions were clustered in three groups: "focus on information in your current environment; focus on knowledge in your current work environment (how do you know something that you don't know)."[15] Newman's third group was beyond the scope of our project because the questions ask about a future work environment ten years down the road. We sent out the following questions:

1. What Projects are you currently working on?
2. What phase is the project in?
3. What are your current responsibilities in supporting the project?

4. What products are you responsible for producing?
5. What reviews are you going to have to support and with what products/information?
6. How and where do you get information on your responsibilities and deliverables?
7. Does your project have a library? [Docushare repository]
8. What information/references/aids would help you do your job better?
9. What other information (project related, Laboratory related, NASA related, etc) would you like to be able to access to help you?
10. What are the three most important organizational features of an on-line library/reference for you?
11. What are the top five types of reference material/information most important to you?

Our questions were most effective in gaining insight into what types of information were most valuable at different phases of a project. They were least effective eliciting responses to Newman's second type of question which is how do you know when you know something you don't know. In other words, how would we establish the pedigree of the information?

Most of the content requirements were JPL gray literature, organizational information:

Fault Protection Requirements
Functional Block Diagrams
Requirements, level definition, content and structure
Flight rules
Review materials (Presentations, Preliminary Design Reviews etc.)
ATLO (Assembly, Test and Launch Operations) plans, schedule, tasks, timing with rationales
Margins (settings, assessing, reporting)
Resource utilization as a function of time
Lessons Learned
Stories providing context to Lessons Learned
Ease-of-use requirements for the library were keyword and full-text searching and browsing.

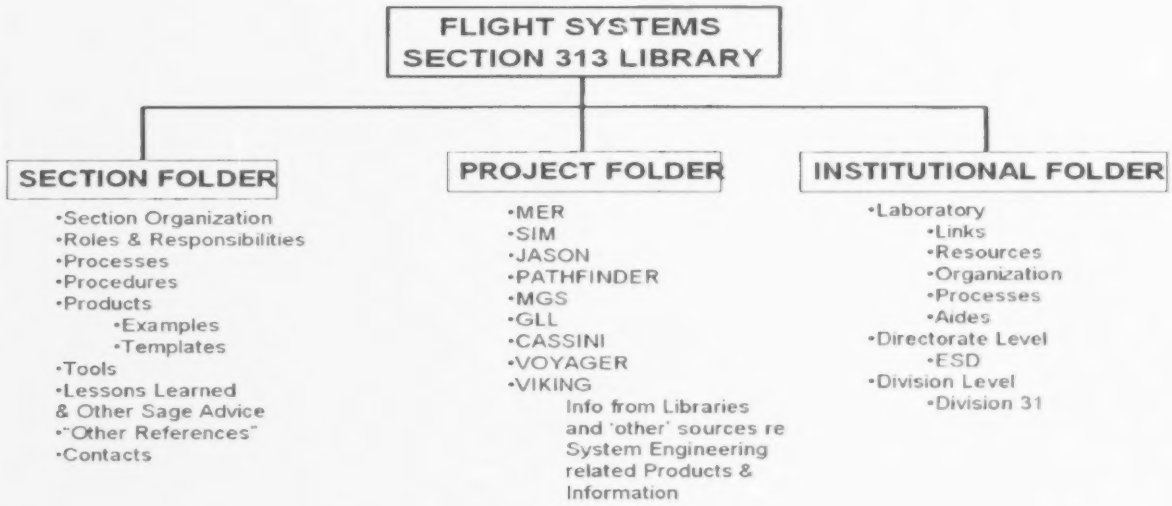
The team decided to stick to the business drivers helping the new engineers shorten the query cycle with a new tool that could be rapidly deployed. The content was divided into high, medium and low priority. The high priority material included: Functional Requirements; Mission plans; Functional Block Diagrams; Flight Rules and Constraints; Preliminary Design Reviews; Critical Design Reviews and Launch Readiness Reviews. The criteria for high priority was material based on JPL design principles where quality examples and templates would significantly reduce development time and reduce risk of diminished performance.

The medium priority material included: Fault Tree Analysis; Fault Protection Design Description Documents; Launch Vehicle Interface, Requirements and Controls Documents,

Interface Control Documents and System Requirements Reviews. The low priority documents included: Launch/Hold Criteria Documents; Pre-Ship Reviews; and Flight Operations Reviews.

Organizing the Collection

Organizing the collection sounded a lot like system engineering to the team, and it was their favorite part of the project. We played dueling diagrams and eventually settled on one



The resulting structure bore little resemblance to the identified content groupings. It seemed more productive to make extensive use of metadata for document types, such as functional requirements documents, and include an alphabetical list of documents.

The JPL Library was to be linked under the Institutional Folder, but it was clear from discussions that many of the young engineers were unfamiliar with the range of on-line resources at our site such as the wealth of full-text handbooks or databases beyond the one available at their university. Many were also only familiar with the particular information architecture design of the web site at their university library. It was clear that a fresh look at presentation of the JPL Technical Library's resources in their environment would be beneficial.

Currently, one of our technical librarians is experimenting with a different group JPL in innovative ways to communicate and present narrowly focused selections from digital collections for which we have paid site licenses.

Implementation and Population

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The plot thickened—seriously. JPL's authentication and authorization system development team had been sent back to the showers after one of their design reviews. The Library project has been put on hold because all of the content must be reviewed for restricted access for proprietary information and export controlled information. JPL has a diverse workforce that includes contractors who may be in competition in certain circumstances and foreign nationals who are entitled to certain information but often restricted on other information. It appears that some of the technical problems will soon be resolved and perhaps the project will resume.

Populating the library will still contain challenges because the content will have to be reviewed as though it were going to be published or sanitized into more of a template. The documents will also have to be reviewed for quality if they are to be used as training and resource material. The level of collaboration will be complicated, but I think the development of a core collection could be of great benefit. Another part of "plan" would be to have some of the senior technical staff have "office hours" to provide context and guidance to the young engineers. Because I am working on this project, and the JPL Know Who Directory which has close ties to the mentoring program, I do see possibilities of a Flight Systems Engineering Section Support Program for the rapid deployment environment.

CONCLUSION

The JPL Library successfully developed strategies to meet the goals of JPL to design low-cost planetary missions by changing the process, the tools and developing the networks to leverage knowledge at JPL.

ENDNOTES

[1] Barnett, Philip M. *The evolution of a federally funded research and development center: an analysis using four theoretical frameworks* [dissertation]. Claremont Graduate University : Claremont, California., . 2000 p. 316.
[2] Ibid., 318
[3] Ibid., 322
[4] Ibid., 319
[5] Ibid., 339
[6] Ibid.
[7] *The JPL Library Customer Survey: report to management. February 12, 1993,* p. iii.
[8] Ibid., 15-16
[9] Douglas, Kimberly. *JPL library study and executive summary. December 17, 1993 p. 63*
[10] Ibid.
[11] Flight Systems Section 313, http://eis.jpl.nasa.gov/sec313/
[12] Barnett, p. 321
[13] Ibid., 323
[14] Newman, Wilda B."Some research results on knowledge management and end user work environments in 2010" in *Independence to inter dependence, the next phase in the information revolution : 91st annual conference,* Philadelphia, 2000, p.69
[15] Ibid.

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Marketing Library and Information Services: Comparing Experiences at Large Institutions

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ABSTRACT

How do the libraries at large institutions market information services to a diverse community of users in an increasingly digital and complex environment? Both Indiana University and Abbott Laboratories are large organizations with multifaceted collections of information. This paper explores some of the similarities and differences between publicizing information services within the academic and corporate environments, and it shows some innovative online marketing tools, including an animated gif model of a large, integrated current awareness system, that helps educate users and spreads the word about changes in the library, new opportunities for staying informed, and new information tools. Details about how this model was created are presented. This paper also suggests that computer literate librarians can be very effective in applying their skills to the marketing process in libraries.

INTRODUCTION

This paper attempts to do something tricky, comparing the marketing experiences of "apples and oranges"; where the apple is a commercial entity, Abbott Laboratories, and the orange is an academic institution, Indiana University. While the information needs and audience of each institution differ widely (hence the analogy), they both have libraries whose common missions are to serve the end-users' information needs. The success of any library is dependent upon numerous factors, among these are getting users to use the library and making them aware of the library's services. Making the library indispensable has been called the secret to library marketing.[1] Using the web to publicize library tools seems to be an effective strategy in spreading the word about resources, and librarians' ability to create web-based marketing tools is at least suggested by the Association of Southeastern Research Libraries (ASERL) recently posted "Competencies for Research Librarians" web page.[2] These competencies stemmed from the ASERL Education Committee's goal to identify the *education needs* of research librarians today.

It is important to clarify what marketing means in a library environment. Marketing is not so much about "selling" information products to researchers, as it is more about spreading the word about potentially useful new tools. It is also about keeping users informed about library activities and involving them in collection development. It is more about integrating new research tools into existing, effective research processes, and in some way enhancing researchers' work, rather than selling the tool to users as an end in itself. As librarians market new tools, they should know how the tools may offer clarity, and not simply contribute to noise for the users. Effective marketing can only occur when librarians understand, at least in a broad sense, what the scientists, professors, and graduate students are already doing to keep informed, and what their research projects are about.[3]

COMPARISON AND DISCUSSION

Indiana University (IU) is a classified as a "doctoral/research university – extensive" according to the Carnegie Research classification scheme.[4] It is a large, midwestern school offering 186 majors to over 37,000 undergraduates, and granting over 100 different degrees at the doctoral level. At the central campus, the sciences alone depend upon seven separate subject campus libraries. The science departments have several hundred professors and graduate students, and nearly all require library and information services to one degree or another. Abbott Laboratories is a diversified global healthcare company headquartered in northeast Illinois with 70,000 employees located 130 countries. Abbott's mission is "to discover, develop, manufacture, and market products and services that span the continuum of care—from prevention and diagnosis, to treatment and cure."[5] Abbott's principal businesses are pharmaceuticals, nutritionals, hospital products, and diagnostics.

Abbott's Library Information Resources (LIR) supports the global information needs of Abbott scientists (e.g. chemists and pharmacists), lawyers, and business development personnel. A majority of LIR's resources are accessible to any Abbott employee—and only Abbott employees—via the LIR Intranet website. Like all commercial entities, security against unauthorized viewing of confidential information is of paramount importance to Abbott. Services, rendered services, and LIR web pages are deemed confidential and are only intended for authorized Abbott personnel. The Intranet provides just one of the many levels of security and it is not accessible from the World Wide Web. In contrast, security (in terms of authorized viewing) of the IU Libraries web pages is of a lower priority; the vast majority of the websites are viewable from the World Wide Web making them viewable by anyone.

Table 1 shows a holdings comparison between LIR and IU. The table highlights the fact that the scope of IU's libraries is more broad than Abbott's LIR.

	Books	e-Journals*	e-Databases*
Abbott's LIR	11,500	530	> 30**
IUB Libraries***	6,000,000	>20,000	~ 230

Table 1. Holdings Comparison of LIR and IU

* Resources that are accessible through the libraries' web pages

** LIR also subscribes to other online databases not accessible from the LIR web site

*** These numbers correspond to IU's main campus (IUB) located in Bloomington, IN

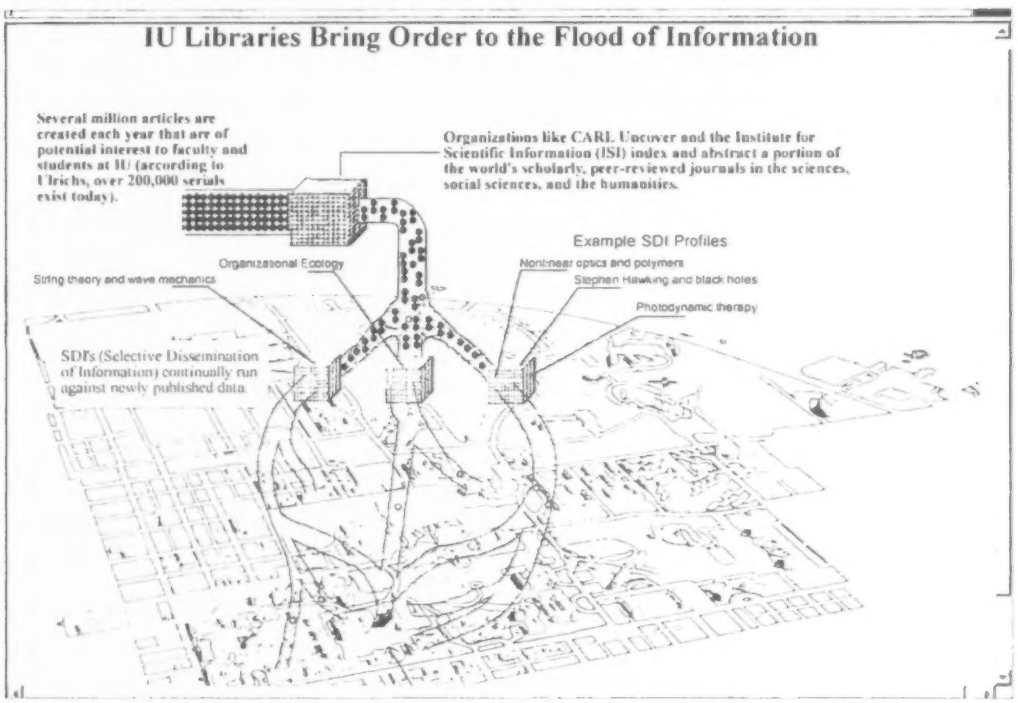
As a commercial entity, the information needs of Abbott are very focused and deep on the healthcare industry and generally will not deviate significantly from their principal businesses. IU, on the other hand, like other large research universities, must attempt to collect information for many subjects, and provide a library environment that can support in-depth research in many unrelated disciplines. These different environments affect how information is marketed to the user communities.

Although Table 1 exemplifies the "apples and oranges" analog, there are nevertheless similarities between IU and Abbott, and these similarities are related to four categories of library services: access to print and e-resources, research services, document delivery, and training services. For LIR, research services include literature and patent searches, drug pipeline reports, company and market research reports, government regulatory updates, and alerting services. Alerting services can either be client controlled or mediated by LIR staff. For IU, research services can mean answering in-depth reference questions, doing cited reference studies for tenure cases, compiling bibliographies, etc. For both, document delivery services assists clients with obtaining books, articles, or other documents. Training services offer client's general orientation sessions and personalized training in the use of print and electronic resources.

For both organizations, the success of the Library is dependent upon satisfying the clients' information needs and marketing the services that fulfill these needs. One such need common to both organizations is that clients need to be kept abreast of current developments in a given topic. Therefore, SDI (selective dissemination of information) services are an important function to both libraries. To this end, both organizations have developed innovative web based solutions for delivering and marketing the SDI services. SDIs have been around for many years, and may be viewed as one aspect of the more recently coined, broader term, *push* technology.[6] It is often the library that ends up marketing these alerts to users. When SDIs, or other periodic information services are offered, it is important to monitor these processes and get feedback from users on the effectiveness of the service. The prospects for irrelevance, disconnectedness, or redundancy must be kept to a minimum if the information services are to take root and serve a purpose.[7] It is important to know how the tool may offer clarity, or reduce the need to scan information in traditional ways.

In late 2001 IU bought the Institute for Scientific Information's *Current Contents Connect* (ISI-CCC). To help market the new SDI service at IU, a web animation was created (Figure 1). The animation uses the analogy of pipes and gates to show the "flow" of article citations from ISI (or CARL Uncover) to end-users at IU. Each journal citation (balls; in color on the web) passes through an SDI profile (cube) and the profile only allows selected bibliographic citations to pass. Eventually the citations will arrive at their desired location, thus alerting the user to the existence of the published article. The large cube represents the information providers' selection process; ISI only includes a portion of all the scholarly information created, therefore they are filtering information.[8] The three smaller cubes represent the multitude of individual personal profiles, divided into three broad areas: Sciences, Social Sciences, and Humanities. The smallest individual squares are Boolean search statements that comb through the new publications and tag citations for delivery. This animated gif was created using Macromedia Fireworks 3.0. The animated gif works analogously to a movie; the gif is

composed of 60 individual frames. All the frames are shown in a timed sequence that gives the illusion of motion. Waugh created the gif while he was a School of Library and Information Science (SLIS) graduate student working for the IU Swain Hall Library. Without the technical skills to create an animation that illustrates how information may "flow" through the university, marketing of ISI-CCC would have been done strictly by word of mouth and verbal/ written descriptions. The animation is ubiquitous while other marketing techniques such as word of mouth have built-in limitations.


IU Libraries Bring Order to the Flood of Information
Several million articles are created each year that are of potential interest to faculty and students at IU (according to Ulrichs, over 200,000 serials exist today).
Organizations like CARL Uncover and the Institute for Scientific Information (ISI) index and abstract a portion of the world's scholarly, peer-reviewed journals in the sciences, social sciences, and the humanities.
Example SDI Profiles
Organizational Ecology
Non-linear optics and polymers
String theory and wave mechanics
Stephen Hawking and black holes
Photodynamic therapy
SDI's (Selective Dissemination of Information) continually run against newly published data.
Figure 1. Current awareness model at: http://www.indiana.edu/~libswain/indiana.htm

Marketing the SDI system resulted from instructional sessions as part of IU's "Library Updates" series. In early 2002, as part of that series, two sessions were offered for CCC, and the alerting service was demonstrated to faculty and graduate students. In the first session, there was little turnout (probably because there was a short time period between marketing (flyers and e-mail) to the actual meeting), and the librarian was able to instruct one-on-one. Seven more people signed up for the second session. Prior to instructing them, the librarian was able to take the names from the sign-up sheet, and look at the departments and publications of each of the attendees. Rather than give a generic description of the new service, the librarian was able to customize the session. Examples were used that drew individuals' attention to the potential value of an SDI system, because the examples were formed from participants' current research. The second session was more successful in that people stuck around after it was over and designed searches themselves; they also suggested to the librarian that he attend faculty meetings to spread the word about the service. During the training sessions, the above graphic was used to introduce the concept of SDIs. Currently IU has approximately 90 users with 130 searches, and

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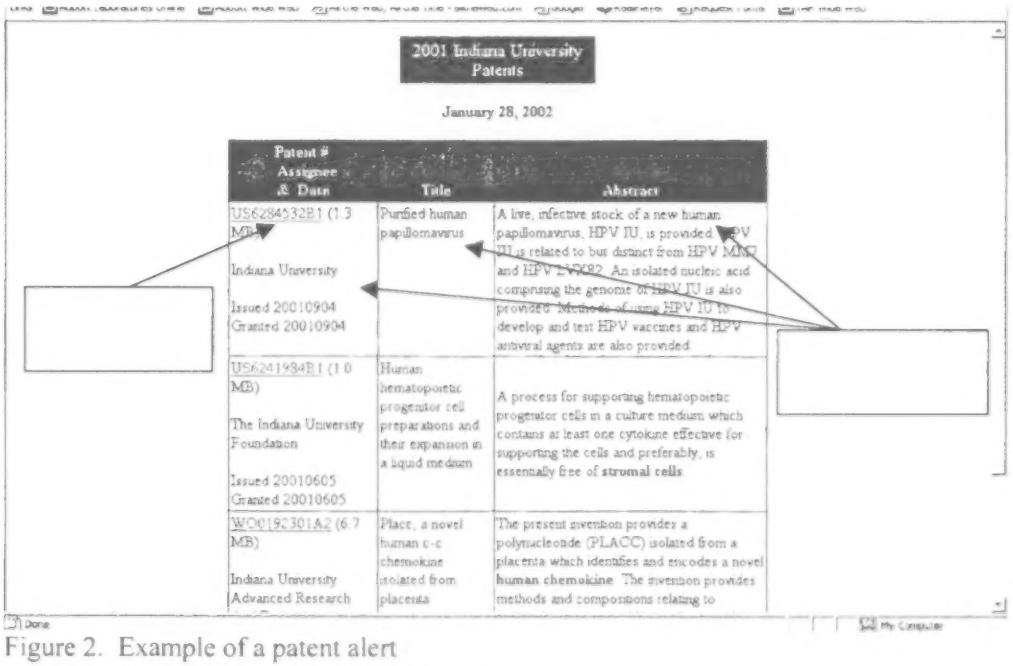
approximately 10 new users are added monthly. The cap to the number of searches IU may put in place is set at 500.

LIR also provides several SDI services; among these are patent alerts. These alerts are generated in regular intervals by running a query against a web based commercial patent database. Typically the alerts would have 100+ patents and were initially distributed to the clients via email as a single PDF file. Since the PDF was originally created from a TIFF image, the file was not text searchable. Abbott's clients had to manually scan the file for relevant information—a laborious and time-consuming task. The clients suggested that a text searchable format would be of value. A new web based patent alert delivery format was developed that addressed the client's request for text searchablity (Figure 2). This format presents the clients with a high level snap shot of the patent and the ability to view the entire patent. The high level snapshot is presented on the web page by table containing patent number, assignee, issue date, title, and abstract—all of which are all text searchable using the browser's Find functionality. In addition, the web page format allows for words and/or phrases to be bolded for added emphasis. For an in-depth view of the patent, the client can click on the patent number, which is hyperlinked to the full PDF. Clients have positively reacted to the new format calling it an improvement over the previous format and much more "user friendly." The positive response from clients, and the quick web page generation, have resulted the LIR conducting more patent alerts.



2001 Indiana University Patents

January 28, 2002

Patent # Assignee & Date	Title	Abstract
US6284532B1 (1.3 MB) Indiana University Issued 20010904 Granted 20010904	Purified human papillomavirus	A live, infective stock of a new human papillomavirus, HPV IU, is provided. HPV IU is related to but distinct from HPV MN7 and HPV 16X82. An isolated nucleic acid comprising the genome of HPV IU is also provided. Methods of using HPV IU to develop and test HPV vaccines and HPV antiviral agents are also provided.
US6241984B1 (1.0 MB) The Indiana University Foundation Issued 20010605 Granted 20010605	Human hematopoietic progenitor cell preparations and their expansion in a liquid medium	A process for supporting hematopoietic progenitor cells in a culture medium which contains at least one cytokine effective for supporting the cells and preferably, is essentially free of stromal cells.
WO0192301A2 (6.7 MB) Indiana University Advanced Research	Placr, a novel human c-c chemokine isolated from placenta	The present invention provides a polynucleotide (PLACC) isolated from a placenta which identifies and encodes a novel human chemokine. The invention provides methods and compositions relating to

Figure 2. Example of a patent alert

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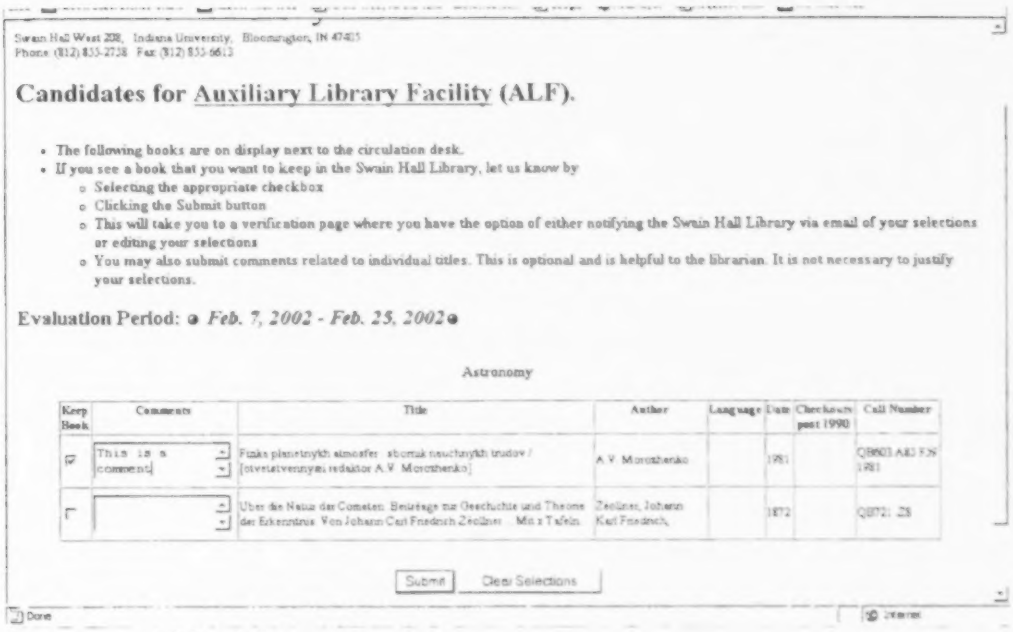
The web page is quickly generated using an in-house custom written Visual Basic program. Being produced in house affords great flexibility in adapting and modifying the program--with short turnaround times. Waugh, after being hired by Abbott, learned Visual Basic and wrote the program to generate the patent alert web pages. It is the combined knowledge of programming and an understanding of the needs of the library that has resulted in the development of this and other valuable information processing programs for the LIR

Like many university libraries, the libraries of Indiana University are facing a collection space problem. The space problem has been addressed by gaining funding for an additional storage facility named the Auxiliary Library Facility (ALF). It is scheduled to be completed in late 2002, and it promises to dramatically reduce the IU libraries' problems associated with space. Currently the Libraries are generating lists of books and other media to be transferred to the ALF. In preparing materials for remote storage, the faculty in several science departments has requested that they be kept abreast of selections for storage. Generating lists, and obtaining feedback from IU faculty was a challenge that we were able to overcome with an interactive, internal web site; the Candidates for Auxiliary Library Facility submission web pages (see Figure 3a-c). The general idea is that a librarian selects and presents to the faculty a list of books for movement to the ALF. The faculty can view the book list, mark the books that they *do not* want transferred to the ALF, make additional comments, and send the selections and comments via email to the library.

The ALF submission web site contains three pages, the list of books for submission (3a), submission verification (3b), and final submission (3c). The first page presents the viewer with a list of books. Using the checkboxes the viewer can select the books that they do not want to go to the ALF and type any corresponding comments in the textboxes. Clicking the submit button presents the viewer with a verification page in which they have the opportunity to check their selections and comments before sending an email. If the viewer is satisfied, clicking the send email button sends the selections and comments to the library.

The ALF web pages are generated dynamically using Perl CGI scripts. While a SLIS grad student, Waugh wrote the scripts so that IU Library staff can generate ALF web pages from only a text file containing the books' bibliographic information. The knowledge of Perl scripting was gained through one of IU SLIS courses.[9] SLIS graduate students have enabled the science libraries at IU to create innovative marketing tools. The science libraries have traditionally brought in first and second year SLIS students as part-time staff. The purpose is to give graduate students practical experience in a library setting, and for the library in turn to gain some of the latest technical skills taught in the graduate library school. It seems that this sort of practical experience directly supports ASERL's recent core competency recommendations.[2]



Swain Hall West 208, Indiana University, Bloomington, IN 47405
Phone: (812) 855-2738 Fax: (812) 855-6613

Candidates for Auxiliary Library Facility (ALF).

- The following books are on display next to the circulation desk.
- If you see a book that you want to keep in the Swain Hall Library, let us know by
  - Selecting the appropriate checkbox
  - Clicking the Submit button
  - This will take you to a verification page where you have the option of either notifying the Swain Hall Library via email of your selections or editing your selections
  - You may also submit comments related to individual titles. This is optional and is helpful to the librarian. It is not necessary to justify your selections.

Evaluation Period: ● *Feb. 7, 2002 - Feb. 25, 2002* ●

Astronomy

Keep Book	Comments	Title	Author	Language	Date	Checkouts post 1990	Call Number
☑	This is a comment	Fizika planetnykh atmosfer : sbornik nauchnykh trudov / [otvetstvennyĭ redaktor A.V. Morozhenko]	A.V. Morozhenko		1981		QB603.A83 F59 1981
☐		Über die Natur der Cometen: Beiträge zur Geschichte und Theorie der Erkenntnis. Von Johann Carl Friedrich Zöllner ... Mit 2 Tafeln.	Zöllner, Johann Karl Friedrich,		1872		QB721 .Z8

Submit Clear Selections

Done

Figure 3a. ALF book list page

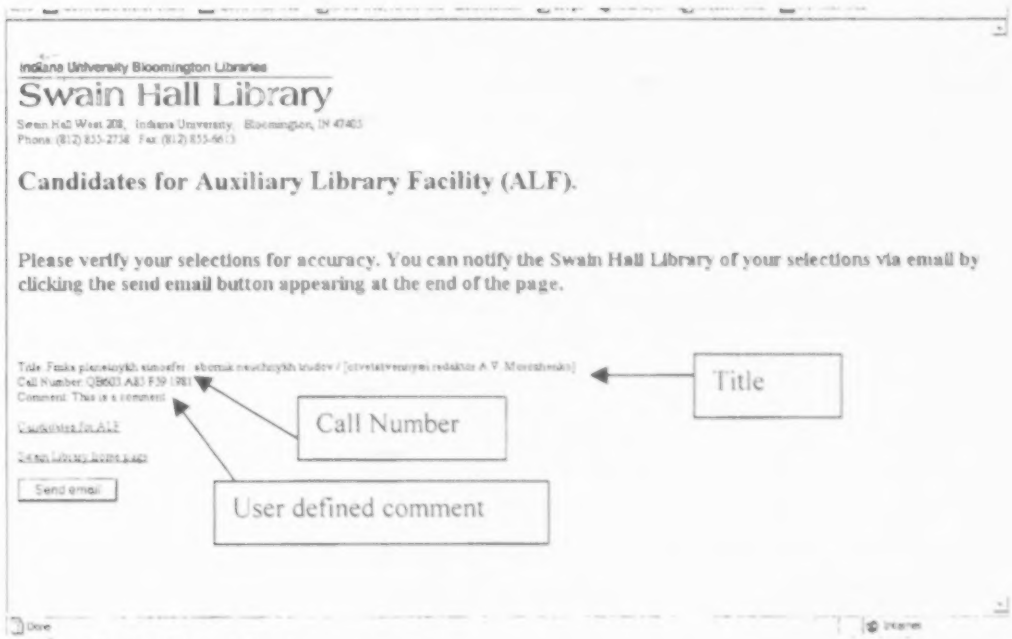

Indiana University Bloomington Libraries
Swain Hall Library
Swain Hall West 208, Indiana University, Bloomington, IN 47405
Phone: (812) 855-2738 Fax: (812) 855-6613
Candidates for Auxiliary Library Facility (ALF).
Please verify your selections for accuracy. You can notify the Swain Hall Library of your selections via email by clicking the send email button appearing at the end of the page.
Title: Fizika planetnykh atmosfer : sbornik nauchnykh trudov / [otvetstvennyĭ redaktor A.V. Morozhenko]
Call Number: QB603.A83 F59 1981
Comment: This is a comment
Candidates for ALF
Send email
Title
Call Number
User defined comment
Done

Figure 3b. ALF verification page

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Indiana University Bloomington Libraries
Swain Hall Library
Swain Hall West 208, Indiana University, Bloomington, IN 47405
Phone (812) 855-2758 Fax (812) 855-6613
An email has been sent to libswain@indiana.edu. Thank you for your patronage!
Candidates for ALF
Swain Library home page

Figure 3c. ALF final submission page

The IU Swain Hall Library, the library for the IU Physics, Astronomy, Mathematics, and Computer Science departments, was the only library to use the ALF web page submission form. Although initially well received by a few of the faculty and other IU librarians, and was "in production" for three months, the ALF web page submission form never developed as a functioning service. During its production trial, the submission form was only used once. We believe that a factor contributing to the submission form's lack of use was poor marketing. Outside of an email to the faculty alerting them to its existence, no marketing of the product was done. The Swain Hall Library never convinced the faculty members that using this service would benefit them. Even the faculty members who were initially receptive to the service did not take the opportunity to comment on books selected for remote storage. The ALF web page submission form never developed an enthusiastic user base. It is unclear whether this was largely due to faculty being uninformed, or mainly because faculty had little to say about the selections for storage. In other words, the fact that faculty did not respond may in large part be due to the fact that the selections for storage were fairly low-risk candidates anyway, i.e. everyone agreed that these books could go, so there was no need to submit comments or make alternate suggestions.

CONCLUSION

For a library service to be successful, there must be buy-in from the clients that the tools or databases are worthwhile. They must understand what the services are, and be enthusiastic about how they will be helpful. For both the IU Libraries and Abbott's LIR, the challenge is to work one-on-one with users, listen to their information needs, and as much as possible deliver library services that are meaningful and productive to them. While Abbott Laboratories and

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Indiana University differ in many fundamental respects, they are similar in that their libraries must serve large, decentralized groups of researchers.

Hiring computer literate people helps libraries develop innovative marketing techniques. Library and Information Science schools should emphasize courses that teach technical skills, including computer programming, in the context of building collections, disseminating information, and spreading the word about new databases or increased functionality. As we have seen, the web offers a unique environment whereby information services can be brought to life, and new methods for disseminating customized reports can be explored. It is particularly important for large organizations to make use of the web. Without library staff equipped to master the software and programming required to create these tools, the library misses opportunities to both publicize and customize information for users.

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Meeting the Needs of Travel Clientele: Tried and True Strategies that Work

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INTRODUCTION

According to *World Tourism Organization* (*WTO*) statistics reported on the web (*www.world-tourism.org*), international travel and its service components continue to be a leading multi-billion dollar global industry. Owing to tourism's fast paced and far-reaching impact, many information professionals encounter questions involving one or more sectors of travel. Since September 11, 2001, the tourism industry has faced challenges in several areas including compliance with new government initiatives, responding in a timely fashion to customer safety concerns, and sensitivity to traveler doubts. The aftershocks of that fateful day have reverberated through society in countless ways.

In a November 2001 online document, the *WTO* reported a decrease in consumer travel confidence. Uncertainty about the economy and terrorism fears prompted consumers to reconsider travel plans. Flight cancellations were particularly notable for long distance trips. Worldwide, governments and tourism industry professionals have taken cooperative measures in response to major disruptions resulting from September 11, 2001. Actions include: assisting travel operations greatly impacted by terrorist and recession events, modifying policies and procedures to meet new security levels, and ensuring continued communication to the public. The travel industry is challenged with becoming more safe, efficient and financially fit.

Tourism's global decline was the subject of a January 2002 release by the *WTO*. According to its analysis, the number of visitors has decreased by as much as thirty percent for some locations. Those hardest hit include countries heavily dependent on US tourists, destinations removed from major tourism markets, and countries predominantly Muslim. Since last September, safety conscious vacationers have selected destinations closer to home and are traveling more by rail. Tourism worldwide is expected to rebound over time as travel sectors are rebuilt and remarketed. *WTO's* newly formed Tourism Recovery Committee is indicative of the industry's commitment to recuperation.

STAYING ALERT: US GOVERNMENT WEBSITES

In recent months, the US government has allocated billions of dollars in grants and loans to the airline industry. By year's end, hundreds of airports offering commercial services will be equipped with bomb detection equipment for checked-in luggage. At these facilities, federal personnel will carry out key security operations (e.g. law enforcement, passenger and baggage screening.) Government websites for American travelers and foreign visitors that were of moderate interest prior to 9/11 are now more closely viewed.

The *US Federal Aviation Administration* website (*www.faa.gov*) reports on security tips for air travelers, aviation regulations, and press releases. Details pertaining to air safety travel abroad, Euro conversion, passports and visas, travel warnings, advisories and consular information are found at the *US State Department* (*www.travel.state.gov*). Another key site, *US Customs Service* (*www.customs.ustreas.gov/travel/travel.htm*), provides border inspection information, item declaration, and a 'know before you go' section. An online Recovery Center, statistics, and expert assistance are provided by *US Tourism Industries Office* (*tinet.ita.doc.gov/*). The *US National Park Service* (*www.nps.gov*) also has a site of interest to travelers. It does not convey safety or advisory information.

Business and medical advice for vacationers are available on specialized sites. The *US Commerce International Trade Administration* (*www.usatrade.gov*) offers online guidance for business travelers and expatriates. The infrastructure, customs, market conditions, and finances for a variety of countries are reported. Immunization requirements, notes about disease outbreaks, precautions for staying healthy, and voluntary cruise ship inspection ratings may be found at *US Centers for Disease Control and Prevention (www.cdc.gov/travel/)*.

COLLECTION DEVELOPMENT

A bountiful, perhaps overwhelming, amount of travel and tourism material is available. In response to client inquiries about destinations, knowledge experts offer in-house materials, electronic resources, and consortially shared items. Subscriptions to online databases and materials available through local sharing agreements have greatly expanded what most librarians consider their institution's 'collection.' Librarians and other information professionals benefit from tools and techniques that assist them in making decisions about which resources they should access, borrow, or purchase for their travel-bound clients.

Booklist, Library Journal, and *Publishers Weekly* present seasonal columns and occasional feature articles to help librarians target quality tourism texts and web-based resources. Online specialty bookstores are also helpful. Title suggestions, annotations and links to sites serving many types of visitors are available at: *Curious Cat* (*www.curiouscat.com/travel/*), *Globe Corner* (*www.globecorner.com*), and *Travel Bug* (*www.swifty.com/tbug*). A host of materials for disabled and mature travelers is described at *Access-able Travel Source* (*www.access-able.com*).

Another approach, conducting a point-by-point comparison of available guides, helps librarians determine the value of individual sources relative to specific clientele queries. Several authors have utilized this technique to identify 'best' texts. David Butwin's article, "Assessing the Guidebooks," compares San Francisco texts and those for Italy. *Rick Steve's* Homepage (*www.ricksteves.com*) offers a '*Guide Book Recommendations for Europe*.' *Kingwood College Library* (*www.nhmccd.cc.tx.us/contracts/lrc/kc/travel-web.html*) provides '*Travel Guide Series,*' '*Handbooks Evaluated Bibliography,*' and '*Travel Handbooks of France*' online. Although these sources do not survey current tourism literature, they demonstrate applications of the point-by-point process.

PROMINENT GUIDEBOOK SERIES AND PUBLISHER WEBSITES

Unlike Palm-held units and other electronic devices, print guides continue to function even if dropped or run over. Travel guidebooks are affordable, durable, portable, and require no power. They continue to be very popular with travelers and are published prolifically. In guides, publishers include destination information, itineraries, advice, tips, and maps for many travel lifestyles and interests. On their Homepages, a growing number of these companies supplement, free of charge, hardcopy titles with information. Guidebook updates, e-forums, e-newsletters, maps, and links are offered to the public. Some publishers also promote their hardcopy titles by providing excerpts or, as in the case of *Rough* guides (*www.roughguides.com)*, complete texts. Libraries owning print guide collections may utilize the MARC '856' field to link travel book records to publisher Homepages. These easy access points dovetail print holdings with current electronic information.

A number of popular series are appropriate for first time, inexperienced travelers. *Fodor's* (*www.fodors.com*) concisely describes lodging, dining, shopping, and sightseeing spots. Over five hundred researchers worldwide submit their material. Each guide is written by committee process. Their *Exploring* series offer a visual treasure trove for trip planners, armchair travelers, and students alike. *Fodor's* Homepage includes a planning center, customized mini-guides, and guide updates. Two examples of popular sources designed for budget travel are *Frommer's* (*www.frommers.com*) comprehensive guides and the *Let's Go* (*www.letsgo.com*) series which is written by Harvard University students for young trekkers. *Rick Steve's* (*www.ricksteves.com*) continental budget guides and television shows present a fun, amusing approach to 'Europe through the backdoor.' While *Access* guides lack Homepage support, their approach 'makes the world your neighborhood.' Maps and texts intermingle street-by-street sights, hotels, shops, parks, and restaurants.

Cultural guidebooks provide visitors as well as armchair travelers and students with architectural, artistic, and historic perspectives. *Blue Guides*, perhaps the most scholarly series, include archaeological sites and less known places. *Baedeker's* presents full-color maps with referenced destination spots. *Eyewitness Travel* and *Knopf* guidebooks present a new, visual encyclopedic approach. Beautiful cutaway drawings of historic buildings and a bird's eye view of parks and streets in famous cities are included. Most publisher websites for cultural texts are not noteworthy. Guidebooks are marketed but provide, little if any, additional content.

Independent and off-the-beaten-path guidebooks present adventurous alternatives to conventional tours. *Lonely Planet* (*www.lonelyplanet.com*) includes authentic experiences in unusual places and third world regions. Their *World Food* series for culinary globetrotters is exceptionally interesting. In 2001, the *Society of American Travel Writers* (*www.satw.org*) (*SATW*) honored *Lonely Planet*'s outstanding Homepage with a Lowell Thomas Gold Award. Up-to-date news and events for many urban areas worldwide are accessible with *Lonely Planet's CitySync* products for handheld devices.

Prizewinning photos of unusual places and information about local customs are featured in *Insight* guides (*www.insightguides.com*). Driving and walking travelers benefit from *Michelin*'s (*www.michelin-travel.com*) texts. In their 'green' series, excellent maps, color

images, and drawings support descriptions of major tour areas, small villages, and museums. Their 'red' series, frequently written in the region's native language, is designed for the discriminating, luxury-bound traveler. Hotel and restaurant lists are featured. *Michelin*'s website offers links to sea and road trips, an e-magazine, maps, and route evaluations. *Moon Travel* (*www.moon.com*) provides backpacking trekkers and driving tourists with less traveled, out of the way excursions. Social concerns, history, topography as well as flora and fauna are discussed. *Rough* (*www.roughguides.com*) texts offer well-researched summaries of historic, cultural, and political subjects. Once an out-of-the-way location has been described in one of these guides it won't remain secluded for long!

The *Live and Work* series offers job hunting, language barriers, and taxation information for business travelers and expatriates. *Culture Shock!* guidebooks offer comparable coverage. Major business travel guidebook publishers, for the most part, do not enhance or supplement print materials at their Homepages. A premiere title outside the major guidebook scope, *Craighead's International Business Travel and Relocation Guide to 84 Countries,* describes business etiquette, protocol, social customs, and living conditions for Americans working abroad.

SELECT PERIODICALS AND THEIR PUBLISHER WEBSITES

Hundreds of magazines are available for all types of travel and lifestyles. A few notable ones are discussed in this section. Many print periodicals are well supported by publisher websites. Current issue excerpts are often available free-of-charge.

A recognized title for pleasure or business travel guidance is *Consumer Reports Travel Letter* (*www.consumerreports.org/Services/travel.html*). Unbiased opinions, money saving ideas, value comparisons, and options are offered. No advertising is accepted. Its Homepage includes travel tips and advice. *Conde Nast Traveler* (*www.concierge.com/cntraveler/index.ssf*) provides affluent tourists with advocacy and news. A readers' choice hotels 'gold list,' travel mall, Perrin Report, Ombudsman, licensed contents of *Fodor's*, photos and an e-forum are provided online. Other popular magazines include *Cruise Travel*, *Ski* (*www.skimag.com/*), *Travel America,* and award winning *Islands* (*www.islandsmag.com*).

Experienced, leisure tourists enjoy *Travel Holiday* (*www.travelholiday.com/*). Out-of-the-way as well as popular destinations, in the US and abroad, are described. Independent and group tour takers benefit from *International Travel News* (*www.intltravelnews.com*). Cruise and rail trip information, travelers' experiences, evaluations, and tips are included. Its Homepage offers advisories, currency exchange, maps and distances.

National Geographic Traveler (*www.nationalgeographic.com/traveler/*), published by the National Geographic Society, received nine *SATW* Lowell Thomas Awards in 2001. This magazine offers exceptional images, news, advice, and destination stories. Educational expeditions with authorities are discussed. Upcoming trips with experts, destination information, and an e-forum are included. National Geographic recently formed an alliance with *Earthwatch Institute* (*www.earthwatch.org/index.html*). Research volunteers and scientists, with grants from

both organizations, will be jointly conducting field explorations. *Earthwatch* is described in the ecotourism section.

Pleasure and business travelers enjoy Harry Shattuck's *Houston Chronicle Travel Guide* (*www.chron.com/content/chronicle/travel*). This column offers news, links, and tips. Archives of the latest two years and *Travelocity's* (*www.travelocity.com*) licensed contents are supplied online. In 2001, Mr. Shattuck was honored with *SATW's* Travel Journalist of the Year Gold Award.

Travel Weekly (*www.twcrossroads.com/*) is a leading industry resource for agents and tourists alike. Worldwide news, analysis, trends and forecasts are reported. Supplements contain feature destination articles. The Homepage includes columns and news. When prompted for member identification, select 'guest.' *ASTA Agency Management* (*www.astanet.com*), published by the American Society of Travel Agents (ASTA), provides market, trend and news highlights. Select 'Travelers' tab to access consumer information. Another useful for professionals is *Jax Fax Travel Marketing Magazine* (*www.jaxfax.com/*). *Meetings and Conventions* (www.meetings-conventions.com/) is an authoritative source for conference issues, destinations, news and trends. Professional Convention Management Association's *Convene* (*www.pcma.org/convene/*) and *Successful Meetings* (*www.successmtgs.com*) are also valuable sources.

SELECT COMMERCIAL AND EDUCATIONAL WEBSITES

Sites referred to as 'travel malls' fold all phases of planning and purchasing into one online location. Travel malls typically track customer preferences as well as offer low fare tickets, lodging rates, and rental car reservations. Due to the range of options available, it is beneficial to review evaluation literature and compare services. A glossary for defining Internet travel terms, including those found at online travel malls, is available at *Casto Travel Inc.* (*www.casto.com/assistant/default.asp*). *Expedia* (*www.expedia.com*) and *Travelocity* (*www.travelocity.com*) are two major competitor travel malls with worldwide destination information for vacation and business visitors. In 2001, *Expedia*'s website received an *SATW* Lowell Thomas Silver Award. Five major airlines banded together in 2000 to form their own successful travel mall, *Orbitz* (*www.orbitz.com*). In the final analysis, utilizing the more personalized service of an agency may still be the best option for many trip planners.

Another source of interest to travelers is destination distances. *How Far Is It?* (*www.indo.com/distance*) establishes the latitude and longitude of two places and then calculates the direct distance between them. *MapBlast* (*www.mapblast.com*) offers directions in nine languages for cities in forty-one countries. Links to travel services, points of interest, street maps, and door-to-door driving directions are provided. *AAA RouteMaster* (*www.aaa.com:8080/routemaster/html/index_sne.html*) identifies construction hotspots, contains the licensed contents of *MapQuest* (*www.mapquest.com*), and provides driving directions for North American locations. For easy access to RouteMaster enter 'AAA+RouteMaster' as a search phrase at *Google* (*www.google.com*).

Popular sites for tracking weather conditions, temperatures, and forecasts in US and international cities include the *Weather Channel* (*www.weather.com/*) and *Weather Underground*

(*www.wunderground.com*). *Intellicast* (*www.intellicast.com*), another resource, offers special reports for skiing, golfing, and sailing enthusiasts. After engaging in a day of sports or other exciting activities, hungry travelers can utilize *Zagat Survey* rating service (*www.zagat.com*) to search restaurants by neighborhood, type of cuisine and the actual restaurant in the US or a few major cities abroad. Los Angeles' dining establishments are well represented on Zagat. Why not add some zest to this SLA conference by selecting from their list!

Online information for both national and international travelers with health concerns is available at *MCW Health Link: Travel Medicine* (*healthlink.mcw.edu/travel-medicine/*). Issues addressed include diving, pregnancy, motion, and altitude sickness. Another resource, *Travel Health Online* (*www.tripprep.com*), provides medical advice, comments on HIV, civil unrest, and road safety. The *US Centers for Disease Control* (*www.cdc.gov/travel/*), previously described in the government website section, gives detailed and timely tips for tourists. Trip planners should always remember to follow their physician's advice and not use reference tools in place of medical consultation.

International travelers are often challenged by time differences, language translation, currency exchanges and size conversions. *The World Clock* (*www.timeanddate.com/worldclock/*) supplies current time for locations worldwide. Common terms, numbers, shopping, dining, travel and directions are translated into seventy different languages at *TRAVLANG* (*www.travlang.com/languages/*). Sound files are included for pronunciation. *Oanda FXConverter* (*www.oanda.com*) provides one hundred sixty-four currency rates (updated daily) and pocket size cheat sheets for travelers. Ten different clothing size charts for US and international measurements are found at *FROMTO.AS* (*Fromto.as/clothing.htm*).

Hostel lodging attracts adventurous vacationers. *Elderhostel* (*www.elderhostel.org*) presents older trekkers with affordable and educational experiences. *HOSTELS.COM* (*Hostels.com*) provides a worldwide directory, e-forum, and tips on inexpensive adventures for young tourists. *The University of Michigan International Center* (*www.umich.edu/~icenter/*) has links to useful sites (e.g. scholarships), travel tips, and opportunities for students working, studying, or traveling abroad.

PROMINENT RESOURCES FOR TOUR PROFESSIONALS

A helpful source for defining specialty jargon is the *World Travel Dictionary: the Dictionary for the Travel Industry*. Another expert tool, *Travel Industry Association of America* (*www.tia.org*) offers pricing and legislation information, news, and statistics online. Other valuable reference sources are commonly published on an annual, or more frequent, basis. Notable titles are included below. Many hardcopy titles are supplemented or enhanced by their publishers' websites. Others merely promote their products online or limit online access to subscribers. Unlike most expert sources, *Weissmann Travel World* and *Star Service: the Critical Guide to Hotels and Cruise Ships* do not accept advertisements.

More than seventy-five thousand tourism contacts in three hundred thirty countries are contained in the *World Tourism Directory*. This multi-volume resource, published in conjunction with the *WTO* and *World Travel and Tourism Council* (*www.wttc.org*), also includes thousands

of Internet addresses. The *World Travel Guide and Atlas* (*www.travel-guides.com/navigate/world.asp*), another impressive work, provides exhaustive information about virtually every country's passport and entry requirements, currency, culture, and contacts. It's Homepage details major airports and ski resorts. Products are also available for Palm-held devices and PCs. *Tourism Offices Worldwide Directory* (*www.towd.com*) offers links to commercial tourism offices, government sites, conventions, and visitor bureaus around the globe.

Directory of Hotel and Motel Companies, an American Hotel and Lodging Association publication, lists corporations and individual facilities state-by-state. This unique source is also available in CD-ROM and diskette format. Other quality hotel reference tools include *Hotel and Travel Index, Official Hotel Guide, Official Meeting Facilities Guide,* and *World Hotel Directory.*

Ship profiles, deck plans, booking information, ports of call, and sailing schedules are included in the *Official Cruise Guide*. North, Central and South American cruises and hotels are reviewed and rated by *Star Service: the Critical Guide to Hotels and Cruise Ships*. *Cruise Critic* (*www.cruisecritic.com*), a tool for first time and seasoned water-bound tourists, is outside the domain of professional resources but may be of use to agents. In 2001, the *SATW* awarded *Cruise Critic* a Lowell Thomas Bronze Award. Another source beyond the scope of expert literature that may be of interest to tourism specialists is the *US Centers for Disease Control and Prevention (www.cdc.gov/travel/).* This site, previously described in the government website section, includes international cruise ship sanitation inspection data.

Weissmann Travel World (*www.weissmann.com*) includes destination itineraries, concierge advice, maps, and insider tips for tour operators. Reports for all countries of the world, thousands of cities, and ports of call are accessible. Recipes, travel tales, a currency converter and world clock are 'coming soon' to its Homepage. Products are available in CD-ROM, diskette and online formats. Through *Weissmann's* partnership with *Neohand* (*www.neohand.com*), one hundred twenty-four *City Profiles* and over fifty *Port and Resort* documents are available for handheld units.

Thomas Cook Timetable guides offer rail, shipping and ferry schedules worldwide. *OAG* (*www.oag.org*) print and database products, including those for wireless devices, are leading tools for all types of flight information. News and OAG Airline of the Year winners are provided online. Subscribers may access air travel details.

ECOTOURISM: A TREND

Leisure visitors enjoy nature-conscious experiential opportunities that offer a win-win situation for a region's travel industry and natural habitat. Ecotourism was introduced abroad in the 1980s and in the United States in the early 1990s. The *WTO's* website (*www.world-tourism.org*) describes this trend and discusses United Nations' International Year of Ecotourism (2002) events. *WTO* reports covering specific areas of ecotourism and sustainable tourism are also listed. Some title entries contain a summary or abstract of the hardcopy text. *The International Ecotourism Society* Homepage (*www.ecotourism.org*) is another useful site. *The Ecotourism Observer*, its online magazine, includes news and feature stories.

Ecologically sound accommodations are often referred to as 'green lodging' facilities. In these locations, environmental conservation awareness motivates managers to assess and rewrite their procedures and policies. 'Green' accommodations implement recycling strategies that save natural resources (e.g. water and energy) and manage waste more efficiently.

Approximately forty worldwide certified establishments are described at the *Ecotel Certification* website (*www.hvsecoservices.com/ecotelcollection.htm*). *Ecotel* approved hotels include luxury establishments that have implemented exemplary recycling, waste management, and community outreach programs. New York City's Benjamin Hotel, Arizona's Miraval Resort and Hyatt Regency at Gainey Ranch are among the US certified properties. *Green Hotels Association* (*www.greenhotels.com*), another notable lodging site, features facilities worldwide utilizing environmentally conscious devices, products and services (e.g. eco-friendly soap, laundry detergent, and optional daily linen or towel changes).

Destinations, government agencies, and organizations supportive of ecotourism are located at *Great Outdoor Recreation Pages* (*GORP*) (*www.gorp.com*). *GORP* offers national and international parks, a travel planner, traveling schedule and special interests (e.g. seasonal picks, family trips). *Away.com* (*Away.com/index.adp*) includes activities for arts, culture and historic travel. Personal narratives, itineraries, and customized planning are also presented.

Earthwatch Institute (*www.earthwatch.org/index.html*), another well-recognized site, describes volunteer expeditions with scientists and educators who conserve natural resources and cultural heritage. This site is organized by region, month, subject, and time frame. *Clean Beaches Council* (*www.cleanbeaches.org*) awards a 'Blue Wave Certification' for selected locations. Beaches are recognized for water quality, environmental sustainability, cleanliness, erosion management, habitat conservation, and safety.

Recreation.gov (*www.recreation.gov*) features campground reservations, national weather service forecasts, and maps. The 'recreation search' provides customized planning. Users select a state, activity, or agency from the list (e.g. National Park Services, Tennessee Valley Authority). A superb site, *National Recreation Reservation Service* (*www.reserveusa.com*), offers an availability calendar and a list of campsites. Cabin amenities (e.g. toilets, bunk beds, stoves) and disability services are described.

Print resources contain case studies of countries, history, and trends. *Ecotourism in the Less Developed World* and *Encyclopedia of Ecotourism* are highly recommended. A related resource, *Tourism Ecolabelling: Certification and Promotion of Sustainable Management* introduces eco-certifying institutions and explains evaluation processes. Specific trends and a directory of tourism ecolabels are provided. *Ecotraveller's Wildlife Guide* and *Hidden* series include lodging, and historical background information for selected destinations. *Great American Learning Vacations* and the *Guide's Guide to National Parks* series are two other notable publications.

CONCLUSION

Many quality resources are available to professionals assisting travel-bound clientele. Over the past several months, knowledge managers have become more keenly aware of government advisory and safety information. While travel destinations, products, and services have experienced varying levels of disruption, the global travel industry is said be in a recovery mode and is slowly regaining its equilibrium.

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The NASA Scientific and Technical Information (STI) Program's Implementation of Open Archives Initiative (OAI) for Data Interoperability and Data Exchange*

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ABSTRACT

Interoperability and data-exchange are critical for the survival of government information management programs. E-government initiatives are transforming the way the government interacts with the public. More information is to be made available through web-enabled technologies. Programs such as the NASA's Scientific and Technical Information (STI) Program Office are tasked to find more effective ways to disseminate information to the public. The NASA STI Program is an agency-wide program charged with gathering, organizing, storing, and disseminating NASA-produced information for research and public use. The program is investigating the use of a new protocol called the Open Archives Initiative (OAI) as a means to improve data interoperability and data collection. OAI promotes the use of the OAI harvesting protocol as a simple way for data sharing among repositories. In two separate initiatives, the STI Program is implementing OAI. In collaboration with the Air Force, Department of Energy, and Old Dominion University, the NASA STI Program has funded research on implementing the OAI to exchange data between the three organizations. The second initiative is the deployment of OAI for the NASA technical report server (TRS) environment. The NASA TRS environment is comprised of distributed technical report servers with a centralized search interface. This paper focuses on the implementation of OAI to promote interoperatibility among diverse data repositories.

NASA STI PROGRAM OFFICE

The Scientific and Technical Information (STI) Program Office has existed since the early days of the National Aeronautics and Space Administration. Its purpose, by statute, is inherent in

* The work entitled , "The NASA Scientific and Technical Information (STI) Program's Implementation of Open Archives Initiative (OAI) for Data Interoperability and Data Exchange," was prepared as part of my official duties as an employee of the U.S. Government and, in accordance with 17 U.S.C. 105, is not available for copyright protection in the United States.

NASA's mission, as defined in the National Aeronautics and Space Act of 1958, is "...to provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof. "

The STI Program ensures that NASA remains at the leading edge of R&D by quickly and efficiently capturing worldwide scientific and technical information for use in problem solving, awareness, and knowledge transfer. Its data collection and dissemination supports NASA's mission to communicate scientific knowledge and understanding by collecting and transferring NASA's research and development (R&D) to the aerospace and academic communities. The program collects the NASA-produced information from 10 NASA Centers and Headquarters, other sources in the U.S., and over 50 foreign countries, and maintains access to the largest collection of aerospace science and technical information in the world.

Some of the STI Program activities include the following, which are to:

- Collect, announce, disseminate, and archive all STI resulting from NASA-funded and sponsored research to reduce duplication of effort and improve productivity and cost-effectiveness of the NASA research effort
- Acquire domestic and international STI pertinent to NASA's missions
- Handle and publish all appropriately reviewed STI for NASA, thus requiring close coordination with export control, patent, copyright, and intellectual property organizations, and international partnerships
- Build and maintain the STI Database
- Coordinate the Agency's various Field Center STI programs
- Develop and implement all Agency policy and procedures for external release of STI
- Monitor a contractor facility, the NASA Center for AeroSpace Information, in Hanover, MD
- Negotiate and handle all STI international agreements (with Code I) for NASA

Over the years, the STI Program Office has faced challenges in its task to acquire and promote information usage. Advances in information technology have fueled higher expectations and increased demand for easy and efficient access to scientific information. Internet savvy users are used to sophisticated search engines that retrieve documents, photos, music, and other kinds of data. Internet users expect more from information providers:

- Desktop access to full-text documents *vs.* abstracts
- Rapid access to documents to meet customer requirements
- Wider access to varied information formats
- Preprints and other forms of gray literature not published in traditional forms (e.g., photos, videos, and graphics)
- High-speed Internet access and web-based architecture
- Better data organization and more-user friendly interfaces

New challenges to information delivery are not the only concerns of the STI Program Office. The high cost of supplementing the NASA-produced information with commercial data in order to broaden the access to scientific and technical research has limited the kinds of

information that the program can make available. Acquisition of commercial data is expensive and restrictive licensing hinders efforts by the STI Program Office to enhance its aerospace knowledge base. As the STI Program continues to face funding challenges, finding alternatives to commercially available information is necessary to ensure that NASA users have the information they need. The emergence of the Open Archives Initiative (OAI) as a technology bridge connecting heterogeneous data sources offers the STI Program a way to build its collection circumventing the problems associated with commercial data. Further, as more information providers start using OAI for data exchange, the breadth and scope of information available to the STI Program will grow.

Open Archives Initiative

One of the main barriers to information exchange is the multitude of metadata formats used by database and archive creators. The Open Archives Initiative grew out of the belief that simplifying data exchange would increase scholarly communication (Van de Sompel and Lagoze, 2001). Costly and hard-to-implement protocols like Z39.50 were barriers to data sharing among repositories. OAI was established as a low-cost, low-barrier protocol for transferring data between archives.

OAI is a relatively new effort. The first meeting of the Open Archives Initiative was held in October 1999, in Santa Fe, NM. The Santa Fe Convention, as the meeting became known, brought together information and computer science specialists to discuss and solve issues of interoperability among electronic preprint (e-print) archives (Van de Sompel and Lagoze, 2000; Van de Sompel et al., 2000). Discussions focused on a new approach to metadata harvesting data between repositories. In this new data harvesting approach, a distinction is made between data providers and service providers. As defined by the Santa Fe Convention:

- A *data provider* is the manager of an e-print archive, acting on behalf of the authors submitting documents to the archive
- A *service provider* is a third party, creating end-user services based on data stored in e-print archives

The convention further defined an archive as a collection of records. Records have the following properties:

- A record in an e-print archive contains, at least, metadata that describes full content
- A record in an e-print archive may also contain full content such as a research paper, a dataset, software, etc. or a bundle of these (OAI, "The Santa Fe Convention")

The Santa Fe Convention did the preliminary work in developing a metadata harvesting protocol by establishing guidelines for identifying archives as data and/or service providers, specifying metadata formats, and harvesting data from data providers. These guidelines were incorporated into the first version of, "The Open Archives Initiative Protocol for Metadata Harvesting," developed in January 2001. The protocol was updated to version 1.1 in July 2001 and release of version 2 of the protocol is scheduled for May 2002.

The OAI protocol differs from other data exchange protocols such as Z39.50 (Lynch, 1997) in that it is designed for simplicity. Harvesting is initiated by HTTP-encoded queries to OAI-compliant archives and metadata is returned in XML. The protocol calls for a standard metadata format based upon the fifteen elements of Dublin Core (DCMI, 1999). The use of Dublin Core removes the burden of trying to map between multiple metadata formats. An OAI-layer can be put over existing information systems using Perl CGI scripts, Java servlets, PHP scripts, or any number of possible implementations.

OAI is an ongoing collaborative effort lead by Herbert Van de Sompel of Los Alamos National Laboratory and Carl Lagoze of Cornell University. An OAI Steering Committee sets policy and a Technical Committee continues development of the harvesting protocol. Funding and support for OAI come from the Digital Library Federation, the Coalition for Networked Information, and the National Science Foundation.

OAI is intentionally designed to be a low-cost, low-barrier approach to information interoperability. The STI Program decided to invest in this promising technology by funding two initiatives to test OAI's applicability in the NASA STI environment. If successful, these OAI projects will significantly increase accessibility of aerospace information for NASA.

TECHNICAL REPORT INTERCHANGE (TRI) PROJECT

The federal government is one of the greatest publishers of scientific and technical information. A great portion of this information is unlimited and unclassified without any formal restrictions for its use. As costs for commercial sources of scientific and technical literature escalate, the STI Program has looked to other federal agencies with similar research programs as partners for collaborative sharing efforts.

The STI Program Office is participating in the TRI Project, a collaborative data sharing experiment with the Air Force, and Department of Energy (DOE) sites. NASA, the Air Force, DOE sites have overlapping research disciplines; therefore, individual collections of documents were of mutual interest to all parties involved. The TRI Project's primary objective is for the exchange of metadata using the OAI harvesting protocol. The project is made more complex because organizations embed links within their metadata records to the full-text image residing on institutional servers. No actual image files are exchanged between participants. Using the OAI protocol in this way means participants will be able collect metadata from each other and access full-text documents. The technical work for the TRI Project is carried out by the ODU Team, a group represented by the faculty and staff from the Computer Science Department at Old Dominion University, Norfolk, VA (URL: http://dlib.cs.odu.edu). The ODU Team created and continues to modify software code that provides the mechanism for data exchange.

PROJECT PHASES

The TRI Project has several different phases. During Phase 1, the ODU Team developed a TRI Software Package for each participant. The project is currently in Phase 2, in which the TRI Package is installed at each participant's site. Software testing and security modifications

continue to occur in Phase 2. The final stage of the project, Phase 3, will be achieved when all the sites are fully operational. The projected completion date for the project is September 2002.

TRI Software Development (Phase 1)

The initial phase of the project involved developing software tools would allow the participants to exchange data. The Old Dominion University (ODU) team created a "TRI Package" for each of the sites. The package consisted of several different software components for the OAI implementation:

- An OAI-compliant repository
- Code to convert organizational metadata from its native format to Dublin Core
- Code to convert Dublin Core metadata back into native metadata format
- Harvesting code
- Harvesting scheduler code
- Log files to track when a site harvests or has been harvested.

Figure 1 shows the TRI Project architecture for one participant. This architecture is duplicated for all the participants in the TRI Project. Each site has its library or information system repository (1). This is the system the users search for institutional data. Metadata from the repository is converted from its native format into Dublin Core (2) using conversion code written by the ODU Team. The Dublin Core data is moved into an OAI-compliant repository (3). The OAI-compliant repository is the harvesting point for outgoing (4) and incoming (5) harvest commands. Newly harvested data is converted from Dublin Core back into the institutional metadata format and ingested into the site's information system (6). Users can now search on metadata from other institutions. It is transparent to users that they are searching data from an external site because the new data in input into the system they are used to searching for information.

TRI Project Architecture (One Participant)

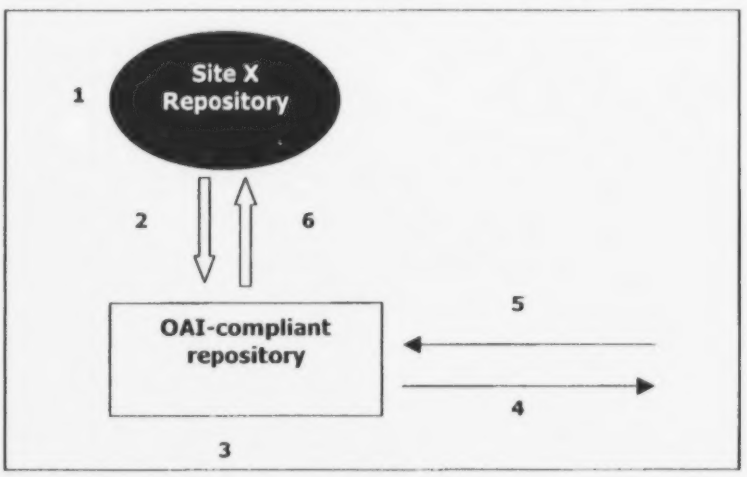

Figure 1

Metadata Formats

Each organization has its own unique metadata format. Old Dominion University worked with each individual organization to develop code to map its native metadata into Dublin Core. NASA uses a metadata format that is a combination of COSATI and MARC format. *Figure 2* illustrates how a NASA converted into Dublin Core from its native format. *Figure 3* shows the same record but coded in XML.

NASA Dublin Core Metadata Record

Source DL:	NASA
Identifier:	http://naca.larc.nasa.gov/reports/1946/naca-rb-l5k02/
Title:	Aerodynamic Characteristics of Four NACA Airfoil Sections Designed for Helicopter Rotor Blades
Creator:	Louis S. Stivers
Creator:	Fred J. Rice, Jr.
Description:	Four NACA airfoil sections, the NACA 7-H-12, 8-H-12, 9-H-12, and 10-H-12, suitable for use as rotor-blade sections for helicopters and other rotary-wing aircraft have been derived and tested. These airfoil sections have comparatively low drags in the range of low and moderate lifes and small pitching moments that are nearly constant up to maximum lift.
Contributor:	Langley Memorial Aeronautical Laboratory
Discovery:	February 1946
Type:	NACA Restricted Bulletin L5K02; Wartime Report WR-L-29
ID:	oai:NACA:1946:naca-rb-l5k02
Set:	NACA
DateStamp:	2001-07-27

Figure 2

NASA Metadata Record Coded in XML (partial record)

```
<?xml version="1.0" encoding="UTF-8"?>
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.openarchives.org/OAI/1.1/OAI_GetRecord
http://www.openarchives.org/OAI/1.1/OAI_GetRecord.xsd">
<responseDate>2002-03-11T22:01:04+00:00</responseDate>
<requestURL>http%3A%2F%2Fnaca.larc.nasa.gov%2Foai%2Findex.cgi%
3Fverb%3DGetRecord%26identifier%3Doai%3ANACA%3A1946%3Anaca-
rb-l5k02</requestURL>
<record>
<header>
<identifier>oai:NACA:1946:naca-rb-l5k02</identifier>
<datestamp>2001-07-27</datestamp>
</header>
<metadata>
<dc xmlns="http://purl.org/dc/elements/1.1/"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://purl.org/dc/elements/1.1/
        http://www.openarchives.org/OAI/1.1/dc.xsd">
```

Figure 3

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TRI Deployment (Phase 2)

With the TRI Package software developed, the TRI Project moved into its current stage, Phase 2. The ODU Team is helping install the TRI Package at each site. Upon completion of installation, each institution will populate its OAI-compliant repositories with metadata to test the harvesting tools. Testing the TRI Package tools, identifying technical issues, and resolving software concerns will occur in Phase 2. Each institution will need to ensure that security measures are in place for harvesting metadata and accessing full-text documents.

Integration and Full Operability (Phase 3)

Phase 3 is the final phase of the experiment. Each participant will fully deploy the TRI Package. New metadata content will be added to feed the repositories. The ODU Team will develop administration, deletion, and modification functionality into the TRI tools so participants can manage their metadata content. Participants will decide if they would like to continue development of the TRI Project beyond its first several software iterations. Evaluation of the project and assessment of future goals will help determine future possibilities for the TRI Project. The participants may continue with a collaborative approach to project development, or they may decide to do individual implementations of OAI.

NASA TECHNICAL REPORT SERVERS OAI PROJECT

The second initiative sponsored by the STI Program Office is the implementation of OAI for the technical report servers (TRS) at NASA. NASA centers and STI Program Office disseminate NASA-produced information to the public through a network of technical report servers distributed across the Agency. These technical report servers provide access to bibliographic citations and, in some cases, electronic full-text documents. There are two ways users can search the TRS. They can search each TRS individually, or they can search all the TRS via the NASA Technical Report Server (NTRS) (Nelson et al., 1995). NTRS is a meta search engine that conducts search queries across all TRS nodes and displays a canonical list of results. The NTRS receives an average of 100K hits a month.

The present TRS environment supports NASA's mission to communicate its scientific research, however, the security vulnerabilities of WAIS has made it necessary to look at alternative ways of providing access to NASA's scientific and technical information. OAI's data and service provider design architecture offers a new model for data sharing and searching. Centers will become OAI-compliant without having to change their internal publishing processes and significant costs. Some scripting will be necessary to export existing metadata into Dublin Core and XML; however, once complete, OAI will not impact regular operations of the TRS.

In the proposed plans to add OAI capabilities to the TRS environment, the NTRS meta search engine will be modified to become an OAI service and data provider. This moves NTRS from being a distributed searching interface to a metadata harvesting interface. The NTRS will harvest from the TRS at each center and build its own repository of data. Centralizing of data overcomes two of the problems with the current configuration. When users search NTRS now, they do not retrieve an integrated list of results. Results list by each node so users have to scroll

through the list from each center. An integrated repository of data will allow more functionality in sorting and displaying search results. Additionally, an integrated approach to centralizing data means that NTRS performance will not be impacted by TRS downtime. When a TRS node goes down, the meta search engine gets tied up and affects system performance. A centralized repository of data eliminates the scalability problem of a distributed search across multiple nodes.

Figure 4 shows how the TRS and NTRS will interact with each other when OAI is implemented. Users will be able to search the individual nodes as they do now. There will be an OAI-layer over the existing systems that will allow for harvesting by the NTRS server. NTRS will function as both a service provider and a data provider. Other external OAI harvesters will be able to query NTRS for its data. NTRS, in turn, will harvest from external OAI-compliant repositories and increase the amount of subject content available for internal NASA users and the public. As scientific and technical research becomes more cross disciplinary, OAI will provide a bridge between multiple research areas.

TRS and NTRS Future Environment

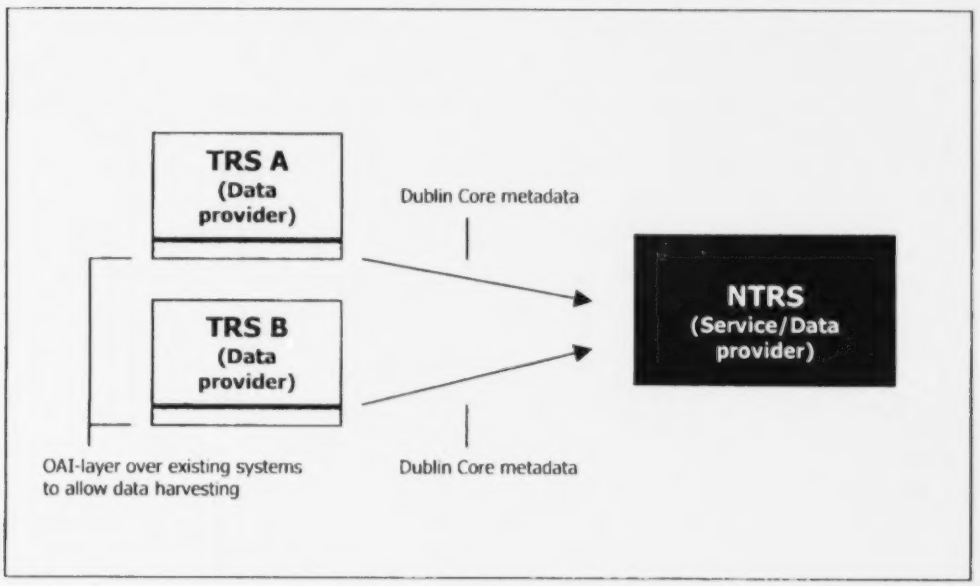

Figure 4

CONCLUSION

The STI Program Office faces new challenges as the Agency enters the 21st century. NASA is a premiere scientific and technical institution. World-class research and innovation demands instantaneous access to a wide-array of information sources. Electronic access and delivery is the de facto standard for information providers like the STI Program. Users are not satisfied with the document delivery paradigm. If they cannot retrieve a document from their desktop, they are less likely to pursue obtaining the document through other means.

The high cost of information delivery and increased user demand for it puts information providers in a quandary. To stay relevant and useful to their customers, information providers must explore new ways to capture and disseminate information without straining already limited budgets. For the STI Program, the high cost of maintaining a software and database intensive environment to support information ingestion and dissemination is a driver in the search for less labor intensive and costly technologies to provide access to scientific and technical information. The search for innovative technologies for information delivery has lead to OAI.

Although the OAI movement is relatively new, the momentum for its use is building. Universities and other federal agencies are funding OAI project to test its functionality. OAI takes an uncomplicated approach to interoperability by using Dublin Core as its standard metadata format. Dublin Core is the lowest common denominator for metadata. It lacks the depth of metadata formats like MARC, however, it is not intended to replace native library metadata formats. Its primary purpose is to provide enough information about an object to be useful in a search. For those organizations interested in providing richer metadata formats, OAI supports using additional metadata formats like MARC.

Simplicity is sometimes the best solution to a complicated problem. OAI can be used to build communities of interest that can define their own data exchange practices. OAI offers the flexibility for simple or complex exchange of data. In the case of the TRI Project, participants plan to allow access to full-text PDF documents. The metadata serves as a gateway to the richer data source, the actual technical report. It will depend upon the OAI communities to determine the scope of information exchange.

The STI Program is committed to finding creative and innovative ways to broaden its information delivery services. By participating in the TRI Project experiment and deploying OAI in the TRS environment, the STI Program will be able to evaluate if OAI is a viable solution to some of the challenges of data collection and dissemination. All signs indicate that OAI has great potential for the STI Program efforts.

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The (Triple) Bottom Line on Corporate Social Reports: CI on the Social Frontier

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AFTER SEATTLE AND DAVOS, COMPANIES GET STREETWISE

Many global companies publish periodic reports on their nonfinancial performance. Responding to pressures such as the anti-globalization backlash and shareholder activism, more corporations are documenting their inputs and outputs outside of managerial finance.[1] These reports mirror in the social and environmental sphere financial disclosure in the traditional recounting of sales, profits and loss. The writer John Elkington is credited with coining the term *triple bottom line* to mean corporate results in the social- and environmental- , as well as economic, realm.[2]

The "frontier" aspect to social reports is lack of predictability as to when, where and with what content they appear. A quick search on Google.com offers some 100 reports in PDF or online under the terms "social report," "social responsibility report," "sustainability report" and similar terms. (I will use the term *social report* to cover the several varieties available in this freewheeling field of corporate disclosure.)

Social reporting is mature enough to have earned that ultimate accolade from North American academics: analysis according to Foucauldian theory. A postmodernist has seen fit to deconstruct the Shell Group's statements on sustainable development.[3] Just as this scholar gleans Shell's form of "discourse" from its thick publication, we who are

more concerned with strategy, marketing or helping business students can do some quick deconstruction for practical insights.

Disclosure: All Over the Map

In North America, no authority regulates these reports in the same way the U.S. Securities and Exchange Commission or Canadian Securities Commissions do financial reporting. A small but growing number of social reports are verified by outside auditors such as KPMG, PriceWaterhouseCoopers and smaller-scale practitioners. Often the publisher includes a comment card and e-mail address for reader feedback; Shell Group has created an open feedback loop, with comments available to the public. In most cases report formats and content are up to the company, so the publications are a chance for companies to present themselves on their own terms. These reports certainly have elements of public relations, as we can see from the often lavish use of illustrations and fancy graphics.

So far no EDGAR system or private vendor gathers social reports into one handy collection – info-entrepreneurs, take note. Identifying and accessing these sources require creativity and some sweat equity. The nonprofit sector has taken on some of the task, and the Swedish organization Tomorrow has linked to several online reports over its web site, www.tomorrow-web.com.

The Company Greets the 21st Century Public

SLA's John W. Graham has shown recently how environmental reports are a rich source of competitor intelligence.[4] Similarly, social reports offer insights into corporate culture, corporate strategy, marketing efforts, government relations and globalization

strategies. They can inform us how ably a firm, perhaps known for its technical or logistical expertise, navigates the waters of stakeholder expectations and pressures.

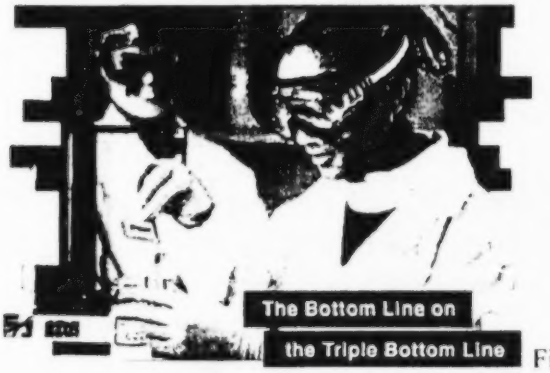

Figure 1. ©Dow Inc. 2001.

Figure one is a recent *Public Report* from Dow Inc. It documents a strategy for Dow's leadership in sustainable development.[5] Its 16 pages detail investments in production processes, and also Dow's outreach to groups concerned with the environment and community life. A chemical industry executive, a job applicant researching Dow, a marketer approaching the company, or a corporate spouse relocating to Midland, Michigan, the headquarters city, should consult this report. A company that produces clean chemical technology, for instance, can gain insight into Dow's plans in the coming years to improve its plant and equipment to meet the goals it sets forth in the *Public Report*.

Demographics is Destiny?

Social reports' blossoming is also the result of concerns of savvy consumers in our media-drenched world. Consumer attention to corporate social behavior reached a new plateau after September 11, 2001. Research has shown consumers most attuned to corporate social behavior are "influentials,"[6] and we can learn from social reports how responsive to the modern market a company may be. You don't have to be a cynic to

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realize companies will not undertake social programs without expecting financial gains for the firm, whether through a better image in the long term or an immediate boost to sales.

Home Depot, for instance, describes on its web site its commitment to sell lumber harvested in a sustainable manner. HD is responding to increased consumer concern with cutting of old-growth forests in North America and exploitation of sensitive woodlands abroad. Activists, connected by the web, lobbied HD, and other retailers such as Lowe's, to commit to sustainable forestry under consumer pressure. Now HD is using the web to communicate with those same consumers, showing its side as a responsive retailer – and one anxious not to lose sensitive customers in a competitive retail environment.

Strategies for an Emerging Market

Figure 2 is British American Tobacco's story. If you do not happen to read Russian, just toggle to English on the web site, www.bat.ru. BAT's tale is of its commitment to Russian society, with BAT describing itself as "instinctively international, with long-held understanding and respect for the cultures in which we operate," and skilled at forming partnerships in Russia's renascent civil society. A firm entering consumer products in the Russian market will want to know it may be encountering a canny competitor and a risk taker. Public relations managers can learn how a cigarette maker spins a tale for an audience starting to form its tastes in lifestyles and brand loyalty.

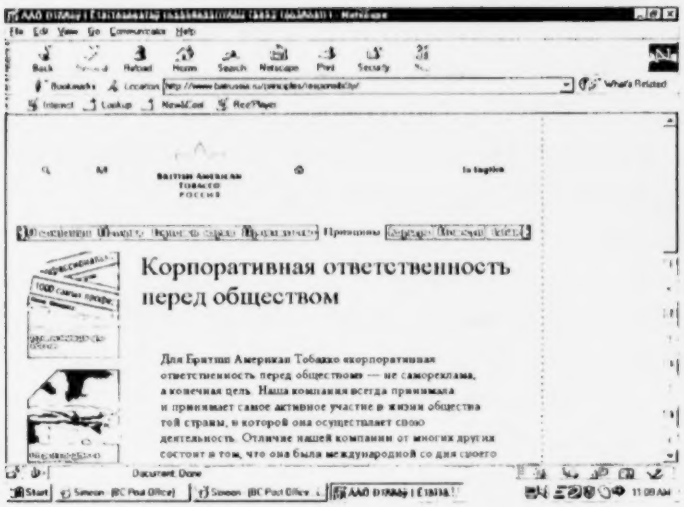

Figure 2. ©BAT Russia 2002.

The homegrown firm Yukos Oil also affirms its commitments to a changing society facing demands for improved medical care and other basic services, while competing for "mindshare" of consumers of petroleum products for homes and cars.[7]

Rankings and Reviews for Selection

Since so may hundreds of firms worldwide report to the community, what are some ways of identifying robust, useful reports that will give an insight into the company? You could click away and download reports for closer inspection, but a more efficient way would be to check some evaluations. The social-reporting phenomenon is mature enough that, besides the occasional deconstruction, a number of "reports on reports" have appeared.

- SustainAbility Ltd. has published a *Social Reporting Report* with well founded evaluations of TBL publications.[8]
- In South Africa, KPMG presents a yearly award for social reports, and has honored SA Breweries Limited and Palabora Mining Company Limited.

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- Press releases are available giving previews on PR Newswire, BusinessWire and Canada Newswire.
- A core of commentators, including Roger Cowe, John Elkington, Sandra Waddock and Simon Zadek, review social reports in newspapers and scholarly journals.

Our Boston College Center ranks companies on social criteria derived from a web-based survey; our library's goal is to acquire social reports for the top 100 firms in our ranking. We have also started to solicit paper copies from the FTSE100-listed companies, which have increasing pressure from the U.K. government and from NGOs to issue detailed social accountings.

Tables, Charts, Graphs and Spin

Social reports in their present, idiosyncratic form have their critics. Scholars have correlated rather shallow social reports with efforts to correct a negative consumer image, such as in Australia's banking sector.[9] As with any corporate communications in competitive markets, it is always good to "trust, but verify," when important managerial decisions are to be based on TBL information. It is not as feasible to cross check TBL data, nor to directly compare companies, as it with required financial filings. However, movements are gathering steam to make social reporting more uniform in western economies, meaning comparisons will be getting easier. The crash of Enron has opened an energetic debate on corporate disclosure, and we can expect changes across the spectrum of disclosure requirements.

ORGANIZING SOCIAL REPORTS FOR RESEARCH AND CONSULTING

Our center at Boston College directly supports about 350 companies in managing their corporate-citizenship programs. The Center has 20 Full-time staff and 25 Associates

who act as adjunct faculty and consultants for us. The Center offers 11 executive-education courses in Boston and other cities, offers consulting services to companies and performs extensive research on corporate citizenship, boasting a dozen major studies in print.[10]

Corporate social reports have proven to be valuable sources for these functions of research, teaching and consulting. One common consulting project is benchmarking corporate social programs. Social reports are a "go-to" source for such benchmarking.

In our callow youth, circa 1990, we solicited such social reports as existed with preprinted cards and accessed them via hanging files. We had a Mac-based online catalog for internal use. The software vendor imploded, presaging the dot-com bust by five years. As electronic forms of the reports arose by 1995, we "dumped 'em on the server." We all know a server can be a Black Hole of information. With a current collection of over 100 PDFs and 200 paper copies, containing many data points on companies with whom we work and which we use as case studies, and a near tripling of dispersed staff, this non-system was unworkable.

We now train assistants to scan incoming reports for content in:

- Measurement techniques
- Corporate strategy
- Participation in globalizaton
- Response to controversies and crises
- Partnerships with community groups and advocacy groups

We then circulate by e-mail PDF reports on a need-to-know basis among on-site staff and some 30 adjunct faculty. For instance, a report from McDonald's with updated

coverage on Ronald McDonald's Children's Charities may go to our staff member designing an Executive Education class on partnerships. She then has contact information, such as a potential guest lecturer from the Charities or a human source for a case study.

We include robust social reports on our periodic accessions lists for staff and member companies, with library location information for paper copies and PDFs and/or URLs for the corporate web sites. We highlight what we consider exemplary productions in either of two monthly newsletters.

Figure 4. CREST catalog. ©Trustees of Boston College 2002.

Our library catalog is now in FileMaker Pro™ 4.0, a flexible and powerful package that posts records easily to our web site. See Figure 4. Access for password holders was configured by an outside vendor and is maintained by the School of Management and the University. Records since 1996 generally include a URL for the

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social report; registered users may obtain, by a "request" button, selected portions of our collection under Fair Use.

FileMaker also has provision for immediate access to a full document with one click. We have commenced approaching a select group of companies – identified through some of the "beauty contests" mentioned previously and rankings we perform – to obtain permission for posting PDFs in the next release of our catalog. We are pleased that almost all the firms we approach care to share their files.

From Collecting to Consulting

A combination of brainstorming, internal marketing and the fact that firms are anxious to share their social reports with us has made them a first-call resource. We now even consult to companies on social-report design and have many examples accessible by industry, size of firm, degree of firm "globalness" and other fields.

In the wake of the Enron implosion, as regulators consider increasing transparency of corporate disclosure, information professionals should press for usable disclosure of social information. You'll help level the playing field for companies and make it easier for our customers to "peer into the corporate soul."

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